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ABSTRACT

This textbook, prepared for a course entitled The Planning of Higher Education: The Private Demand, and offered by the Open University of Great Britain, is divided into four sections. In Section I the course is introduced and summaries of the various units are presented. In Section II, Forecasting the Private Demand for Education, definitions of relevant terms are provided, and demographic projections are discussed in general and for the United Kingdom. The concept of private demand for post-compulsory education is examined with special reference to the Robbins Committee methods of estimating future student numbers. Section III, Factors Influencing the Demand for Higher Education, examines such topics as income, personal preferences, age, and social class and their influence on the private demand for postsecondary education. A "demand function" for calculations is also explained. In Section IV, The Individual's Private Investment in Education, the private costs of higher education and the expected monetary returns from education are examined. Several self-assessment questions are included for the student as well as a list of recommended readings and a course outline. (SF)

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The Planning of Higher Education
The Private Demand

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THE OPEN UNIVERSITY

Educational Studies and Social Sciences: A Third Level Course

Economics and Education Policy I

The Planning of Higher Education
The Private Demand

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Note on reading

Set reading

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Recommended reading

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Further reading

Decision-Making in British Education Systems E221 (1974): Unit 3 'Policy, Finance and Management'; Unit 14 'Decision-Making in Post-School Education', Open University Press.

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For specific references to material used in the text, see the section 'Notes and References' at the back of this volume.

Acknowledgements

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Extract from Freeman, R. B. (1971) *The market for college-trained manpower*, Harvard University Press, reproduced by permission of the President and Fellows of Harvard College, Cambridge, Mass.; extract from Woodhall, Maureen (1970) *The use of cost–benefit analysis in educational planning*, UNESCO/International Institute for Educational Planning; *Figures 2–6* and *Tables 2, 3 and 6* reproduced by permission of the Controller, HM Stationery Office.

INTRODUCTION TO BLOCKS I and II

PAPER 1

PAPER 1

PAPER 1

PAPER 1

PAPER 1

prepared by Adam Westoby

1.1 As its title indicates, this course is concerned with economics and economic studies in so far as they bear on education policy. These connections may be actual, or (as is more usual) possible or potential. The economics of education is pre-eminently an area of applied economics and this course seeks to present it in this spirit. However, embedded within most areas of applied economics are problems of considerable theoretical and conceptual complexity and interest. Some of these are indicated within the course and others are hinted at. In certain cases we have indicated the lines along which you might, if you are interested, pursue such topics further. But in constructing the course we have sought to discipline ourselves by eschewing the merely esoteric or intricate, and concentrating upon those areas of the economics of education which have a reasonably direct bearing upon some of the central issues in educational policy and administration.

1.2 The requirements of such a pragmatic approach are ones to which it is not always easy to maintain obedience, either in constructing such a course or in pursuing it. We have therefore adopted the device of referring briefly in the Introduction to each block to actual statements or problems of policy drawn from the recent history of the British education system. The main goals of the Introductions—both this one and those of other blocks—are thus not only to introduce the main topics you will study within each block, but to indicate, though necessarily in a very preliminary way, how they bear upon a particular policy issue.

1.3 This is not, of course, to say that the members of the Course Team hold that the approaches and techniques explained within the course could provide definitive answers to all, or even any, of the policy issues referred to. This would be to make exaggerated claims for the economics of education as a whole, and its constituent areas. But we have set ourselves the task of persuading you (and ourselves) that those areas of the economics of education which we cover in the course have definite implications for, and contributions to make in attacking some of the central problems of education policy.

1.4 The instrument of discipline we have selected for this Introduction to Blocks I and II is the 1972 Department of Education and Science White Paper *Education: A Framework for Expansion.*[1] Block I carries no conclusion as such; and the Conclusion to Block II should be read as directly relevant to both Blocks I and II. This is because the topics treated in the two blocks are so closely interlinked that their separation into two distinct parts is to some extent an artificial one. There *is* a discernible transition between Blocks I and II—broadly speaking from the standpoint of individual pupils or students and the aggregate behaviour of these individuals to the problems of the national education system in gearing itself to the requirements of the labour market. But the connection between the two blocks is so close that it is essential to treat them in close association with one another.

1.5 What also connects most parts of the two first blocks is a concern with the planning of future provision of places in the education system and its parts—especially the system of higher education. Why plan?

The case for planning can be stated simply—perhaps with deceptive simplicity. It is not, in its essentials, different for education than for many other areas of the economy and society as a whole. Provision for education cannot be made instantaneously. Resources for education must be often prepared (and paid for) well in advance. If pupils are to get schooling within reach of their homes their schools must be built and furnished, and their teachers and other staff must be trained and qualified, then hired and put in post. The same applies in further and higher education, though here the emphasis is less upon *local* provision. In both cases lack of planning, or inadequate planning, will show up later as inefficiency. *Under*provision will lead to overcrowding,

shortage of equipment, oversize classes, long journeys to school. *Over*provision (or provision of the wrong resources) will leave us with unfilled schools, under-used or unemployed teachers and unused equipment. Resources which could, given foresight and planning, be used to meet shortages elsewhere in the education system, or outside it, are being wasted or under-used. The *general* problems of planning ahead to provide the necessary resources in the right places at the right times are by no means peculiar to education. One could easily think of analogous examples of insufficient or surplus capacity in (say) the Health Service, the refining and distribution of oil, or (to take a more local example) the provision of transport and retail services (as well as education) for a new housing estate.

1.6 Such planning issues (mainly at a national level) enter into the basis of the 1972 White Paper. It contained a number of diverse elements: summaries and assessments of the results of past policies and the extent to which their goals had been achieved; statements about government intentions (at that time) for the future scale of enrolment, staffing and expenditure at various levels and in various areas of the education system; the government's response to some central proposals made to it (notably those of the James Report on teacher education);[8] attempts to define (and redefine) differences of character and function among various types of institution, especially in higher and further education; and certain distinctively new policies, such as those for the accelerated provision of nursery education, for the reorganization of teacher training, and for the introduction of a two-year Diploma of Higher Education.* One general feature of the White Paper underlies its approach to all issues; it is described within paragraph 3:

> . . . it is therefore on matters of scale, organisation and cost rather than educational content that attention is mainly focussed in this White Paper. It lays down the objectives at which the government are aiming, the lines on which they intend that each programme should develop and the resources they are planning to devote to their attainment.

1.7 Blocks I and II are not greatly concerned with problems of *organization* in education. The central problem they do take up is that of *scale* (and—by direct implication—the consequences of scale, at different levels and in different subjects and areas, for total costs).

1.8 Block I, Paper 2 ('Forecasting the Private Demand for Education') deals with some of the main problems of predicting the future scale of enrolment. Paper 3 ('Factors influencing the Demand for Higher Education') turns to examine the main factors which determine the level of 'demand' in higher education, and through the pressure of 'demand' exert a pressure on enrolments. The concept of 'demand' is a key one. It is used by analogy with the more usual economic idea of *demand at a price*: meaning the amount of goods that will be purchased (and consumed) at the given price. (This point is underlined and amplified in Paper 2.)

1.9 The fact that economists use demand always in relation to price does not mean that the 'price' faced by the 'consumers' of education is the only, or even the main, factor affecting demand. There are many others. At compulsory levels of education the

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* Many features of the 1972 White Paper, and their place in the overall development of policy, will already have been studied by students who have taken course E221, *Decision-Making in British Education Systems*. It is referred to particularly in Unit 3, paras 4.1 to 4.17 (pp. 46 ff.) dealing with nursery education; and Unit 14, dealing with post-compulsory education. It is at all points essential to bear in mind that the 1972 White Paper, like any policy document, was a creature of its time. But it is in the nature of Open University courses that we could not, even if we thought it relevant, give any up-to-the-minute account of the ways in which the expectations and proposals of the 1972 White Paper have been superseded or modified by later events.

overwhelmingly important factor is the size of the population in the relevant age groups. Beyond the age of compulsory education other factors, including price, come more prominently into play. As paragraph 4 of the White Paper summarizes:

> . . . in the 1960's the main determinant of rising educational expenditure was the increasing number of young people using the education system. The expansion was led by quantitative or demographic factors; larger age groups within the span of compulsory education; rising demand for access to sixth forms, further and higher education; more buildings to accommodate them; and more staff to teach them. There was little respite from the job of simply coping with rising numbers.

Most of Block I, Paper 2 is concerned with the statistical problems of predicting (and then using those predictions to make provision for) numbers of students on the basis of demographic information.

1.10 Then Block I, Paper 3 turns to the problem of post-compulsory education and of the other factors that become of significant importance once the 'consumption' of education is not obligatory. The concept of *demand for education* is implicit throughout the following paragraphs of the White Paper (although the only explicit reference to 'demand' is to the demand by employers for professional and highly qualified manpower).

> 115. The impetus of increasing staying-on in education to 18 will continue beyond the raising of the school leaving age; and the proportion of young people achieving qualifications at the Advanced level of the General Certificate of Education (or its equivalent) will also continue to increase. The planning of higher education provision must make allowance for this, as well as for the increasing size of these age groups over the next ten years. Much harder to foresee, however, is the likely trend in the attitudes and intentions of those young people towards higher education and their requirements within it.
>
> 116. The subsequent career patterns of some of those taking degrees or parallel higher education qualifications in future, for example, must be expected to differ significantly from those of their predecessors. The expansion of higher education provision has already reached the point where employers' requirements for such highly qualified people in the forms of employment they traditionally enter are, in the aggregate, largely being met. These patterns of employment are already changing and will continue to change as employers increasingly take the opportunity to enlarge the areas of work in which more highly educated and qualified recruits can be placed advantageously. Even so, there seems little doubt that the continuing expansion of higher education will more than match the likely expansion of graduate employment opportunities as these are understood today.
>
> 117. Opportunities for higher education are not however to be determined primarily by reference to broad estimates of the country's future need for highly qualified people; although attempts to relate supply to likely demand in certain specialised professions—and, particularly, at the postgraduate stage—will be no less important than before. The Government consider higher education valuable for its contribution to the personal development of those who pursue it; at the same time they value its continued expansion as an investment in the nation's human talent in a time of rapid social change and technological development. If these economic, personal and social aims are to be realised, within the limits of available resources and competing priorities, both the purposes and the nature of higher education, in all its diversity, must be critically and realistically examined. The continuously changing relationship between higher education and subsequent employment should be reflected both in the institutions' and in individuals' choices. The Government hope that those who contemplate entering higher education—and those advising them—will the more carefully examine their motives and their requirements; and be sure that they form their judgment on a realistic assessment of its usefulness to their interests and career intentions.[3]

These three paragraphs of the White Paper could usefully serve as a starting-point for much of the remainder of Blocks I and II. The main task of Block I, Paper 3 is to show how, in principle, one might construct a 'demand function' for higher

education, relating the numbers who enrol (or apply) to the preferences of school-leavers (paragraph 115); to the increasing tendency to stay on into the sixth form (paragraph 116); to the employment opportunities and additional earnings available to them (paragraph 117); as well as to other factors. The opportunities for better jobs and higher earnings provided by higher education are implicit in these paragraphs. What is not mentioned (but is discussed in Papers 3 and 4 of Block I) is the *cost* to individuals of taking courses of higher education—the 'price' which they must pay to make this form of private 'investment'.

1.11 Paper 3 of Block I introduces the private cost of education as one of the elements within (or 'variables' of) the 'demand function'. Paper 4 ('The Individual's Private Investment in Education') brings together the costs of education and the expected benefits or returns from it (mainly in the form of higher earnings), into single measures. These are the basic measures of 'cost–benefit analysis' developed by economists for appraising the relative desirability, or profitability, of investments. This paper brings into a more exact framework the main *economic* consequences—initial costs, followed by higher earnings later on—inherent in the White Paper's injunction (paragraph 117):

> that those who contemplate entering higher education—and those advising them—will the more carefully examine their motives and their requirements; and be sure that they form their judgment from a realistic assessment of its usefulness to their interests and career intentions.

1.12 Block II turns to the main techniques developed by economists and planners through which governments might (in principle) gear the education system more deliberately and closely to the requirements of the labour market and the economy as a whole. The very first paragraph of the White Paper refers to continued educational expansion as being (at that time and in the succeeding decade) essential 'if education is to make its full contribution to the vitality of our society and our economy'.

1.13 So far as the second point—the economic results of education—is concerned the White Paper expresses no important departure in the assessment of public education policy, and never moves beyond pious generalization. It comes nearest to doing this in paragraphs 115–17 on higher education (which we have cited above). Some propositions of paragraph 116 can reasonably be understood as being 'simplified economics', or at least as carrying strong economic implications. It is possible, for example, to read the sentence 'The extension of higher education provision has already reached the point where employers' requirements for such highly qualified people in the forms of employment they traditionally enter are, in the aggregate, largely being met' as meaning that one of the effects of the rapid expansion of higher education during the 1960s was to eliminate a shortage of supply in relation to employers' demand for highly qualified manpower. If this were so then one would expect, *prima facie*, that the earnings of highly qualified workers would have fallen in relation to those of the less skilled, hand-in-hand with the increase in their numbers as a proportion of the labour force (especially in the younger age-groups). Yet no evidence is offered that this has, in fact, taken place nor does the White Paper anywhere propose means whereby governments might actually assess whether or not the education system or its parts are making a 'full contribution to the vitality of . . . our economy', or how any such assessments might be applied to education programmes, each of which 'is in a very real sense in competition for its share of resources with other programmes, both within and outside the education service' (paragraph 7).

1.14 Block II, Paper 1 ('Education as a Social Investment') explains an important economic technique which has been suggested for this: the calculation of *social* rates of return to education (as opposed to *private*, discussed in Block I, Paper 4). The formal framework employed is that explained when introducing cost–benefit analysis in Block I, Paper 4. Costs and benefits distributed over time are discounted to yield a single measure of alternative, or competing, types of education 'investment'—except that,

in this case, the costs and benefits are relevant to the economy as a whole, rather than the private individual. Thus, for example, it is argued that the relevant costs are not the costs incurred by the student but the larger costs involved when one also takes account of substantial government subsidies to higher education; similarly, returns are measured by differences in earnings before, rather than after, the deduction of taxes. In essence Block II, Paper 1 suggests means whereby governments might make concrete and testable the assertion that 'they value [education's] continued expansion as an investment in the nation's human talent in a time of rapid social change and technological development' (paragraph 117).

1.15 These comments are not meant to imply that calculations of social rates of return are no more than straightforward practical exercises, or that social rates of return should be the principal or sole guide in the allocation of funds and other resources within higher education. But if—as is implicit in the 1972 White Paper—government policy rejects the use of indicators of this type,* then it remains legitimate to ask the question: By what sort of yardsticks do national policy-makers intend to test the success of their declared intention to allocate resources to, and within, education with an eye on the necessity for them to make a 'full contribution' to the economy? In the absence of such measures claims of this kind must remain untestable.

1.16 The approach and techniques of 'manpower planning', which are explained and criticized in Paper 2 of Block II ('Manpower Planning and the Demand for Qualified Manpower') are ones which the 1972 White Paper comes judiciously near to explicitly rejecting:

> opportunities for higher education are not however to be determined primarily by reference to broad estimates of the country's future need for highly qualified people; although attempts to relate supply to likely demand in certain specialized professions—and, particularly, at the post graduate stage—will be no less important than before (paragraph 117).

Block II, Paper 2 reviews some central examples among the attempts which have been made internationally, in the post-war period, to forecast and achieve 'targets' of numbers of workers with particular qualifications or levels of education. These targets may be based upon a range of other measures which are themselves projected, and may be based upon them in various combinations. These measures include expected rates of economic growth, both in aggregate and by sector; forecasts by employers of their intentions; and 'physical' projects of requirements for qualified manpower (in, for example, education and medicine—where they are generally based on expected populations and levels of service).

1.17 These latter types of projection are ones which are themselves made, for the period up to 1981, in the 1972 White Paper—mainly for the numbers of teachers required in various sections of the education system. The criticisms of manpower planning made in Paper 2 centre primarily on the fact that it abstracts from the 'price' of the types of labour involved (i.e. their earnings) and therefore can make no direct or systematic comparison between the resources devoted to education, and the returns from it in improving the productivity of workers. Manpower-planning techniques are therefore, in this strict sense, not 'economic' ones.

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* In 1970 the Department of Education and Science discussed more explicitly both the 'rate of return (or investment in human capital) approach' and the manpower planning appoach (see below) as possible guidelines for the development of higher education (DES Planning Paper No. 2 (1970) *Student Numbers in Higher Education in England and Wales*, London, HMSO). Both these approaches were rejected at that time, though the DES saw them as ones which were 'closely intertwined in reality and should not be regarded as independent approaches', and looked forward to the time when more complete information about earnings might begin to 'provide material for the full use of this [i.e. the social rate of return] technique in improving estimates of society's needs for higher education'. These intentions, however, find no substantial echo in the 1972 White Paper (see pp. 2–5).

FORECASTING THE PRIVATE DEMAND FOR EDUCATION

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prepared by Alan Gordon and Gareth Williams

Objectives

At the end of this paper you should be able to:

- describe the difference between an extrapolation, a projection, a forecast and a target;
- show an understanding of these differences by identifying which expression applies to particular statements about *the future*;
- explain the basis of demographic forecasting in the UK;
- describe the Robbins Committee's method of forecasting the demand for higher education;
- make simple projections of the number of potential entrants to higher education;
- explain the problems faced by those making official forecasts of the demand for higher education since the mid-1960s.

1 Foreword

1.1 To an economist the word 'demand' has a specific meaning. It is the amount of a commodity that is purchased at a particular price. Thus the demand for beef is the amount of beef that people buy at whatever the current price of beef happens to be. If the price rises, less is bought. If it falls, more is bought. The demand for education is no different. However, in many countries most education is provided to individuals free of direct money costs, and the demand for education by individuals is sometimes considered as if it were independent of price. In fact all kinds of post-compulsory education have a price to individuals. In some cases the cost may be a direct financial one, with students or parents having to pay fees. More often the cost is the income forgone by students through not working during their period of study. In some circumstances any leisure forgone by students, or indeed by their parents or spouses in order that they can study, may also be considered part of the real economic cost of post-compulsory education.

1.2 Any increase in students' forgone earnings—for example, if the earnings of juvenile employees rise—is equivalent to a rise in the price of education to private individuals. Other things being equal, we should expect the rise in price to reduce the demand for post-compulsory education.

1.3 An assessment of the demand for education is complicated by the fact that education has both consumption and investment aspects. People seek it partly for its own sake (consumption) *and* partly because it can lead to greater rewards later (investment). The demand for a consumption good depends on the price of the good and on consumers' preferences or tastes; the demand for an investment good depends on the price and on anticipated benefits. In the next two papers of this block you will be examining various aspects of the private demand for education. You should never forget that the underlying idea is *demand at a price*.

1.4 Much of the discussion in these next two papers is couched in terms of the problems that policy-makers face in forecasting the demand for education. Any such forecast and any plan for meeting the demand from individuals is making at least implicit assumptions about the price at which that education will be offered to students. As you will see later in the course, the fact that there is usually a big difference between what individuals pay for education and what society pays for it has important implications for the analysis of demand.

1.5 While the price of post-compulsory education is likely to affect the proportion of the population who seek it, the number of potential consumers is also of considerable importance. Since education is traditionally concentrated on a small segment of the population, the effective demand for it is more influenced by changes in the number of consumers than is, for example, the effective demand for products like beef that are used by the whole population. Thus our starting-point must be the way in which projections are made of the school-age population. If we can forecast the size of this population correctly, we will know within narrow limits the number of consumers of primary and secondary education, since the whole population between five and sixteen must, by law, attend one kind of school or another.

2 Definitions

2.1 Before we consider demographic forecasting we must spend a few minutes examining the different ways of looking at the future. So far we have used the words 'forecast' and 'projection' as if they were interchangeable. They are often so confused and different authors sometimes use different terminology. There are, however, four separate concepts that you should try to get clear in your mind.

Extrapolation

2.2 An extrapolation is an assumed continuation of current trends in the variable that is being observed. For example, if the proportion of young people staying on beyond the minimum school-leaving age during the past five years had been 34.1 per cent; 34.4 per cent; 34.7 per cent; 35.0 per cent; 35.3 per cent; we might extrapolate percentages for the next three years as 35.6 per cent; 35.9 per cent; 36.2 per cent. More complex extrapolations may be used if past data suggest that the rate of growth is increasing, decreasing or following some other clear pattern. An extrapolation is the simplest kind of forecast of developments or needs—being only a statistical manipulation of data. It presupposes no theories about why the variable is developing in the way that it is.

Projection

2.3 A projection is a forecast based upon a specific assumption about developments in two or more variables that are interdependent. From 1958–9 to 1972–3, for example, the proportion of 16-year-old boys in school was as shown in Figure 1. Extrapolation of the trend would point to a proportion for 1973–4 of between 37 and 39 per cent, depending on the view taken of the apparent change of trend at the end of the period. However, the actual proportion enrolled in 1973–4 was 50.3 per cent. Why was this? Obviously because the school-leaving regulations changed. Any projection for 1973–4 and beyond would need to have built-in assumptions about the direct structural effects of such a change, since some young people who would otherwise have left are now compelled to stay on at school. The change might also have secondary effects in that some young people might modify their educational behaviour. (This matter is discussed in detail in Unit 10 of Course E221.) The important point to note is that unlike an extrapolation, a *projection* implies the adoption of a model of the system, although often a very crude one. The simplest kind of projection is an extrapolation of present trends as exemplified in the familiar disclaimer 'if present trends continue'. However, a projection may make much more complex assumptions. We may have reason to believe, as we shall see later, that the staying-on rate is affected by a number of other variables. Let us say for the moment that one such variable is the level of unemployment among young workers. In this case we might make a number of projections based on different assumptions about the level of juvenile unemployment. A projection is thus a form of *conditional forecast*.

2.4 A projection might be unhelpful or useless if the assumptions on which it was based proved to be mistaken or the conditions for its fulfilment did not prevail. But the projection could not, strictly, be said to be wrong. It would just be irrelevant for any practical purpose. Projections are thus similar to *predictions* in scientific theory, which are also posited on prior conditions.

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2.5 If, however, the underlying conditions are met and the projected event still does not come about, the projection or prediction can be said to be wrong or falsified, and there is clearly something wrong with the model on which it was based. As we have pointed out, conditional forecasts or projections are based upon some model of how a system operates. A projection may turn out to be wrong because the model was poorly specified and it wrongly assumed that current trends would continue. Or it may be wrong because the model was a complex one, consisting of many interacting variables, any one of which could have affected the projected values of the variable whose values were being predicted.

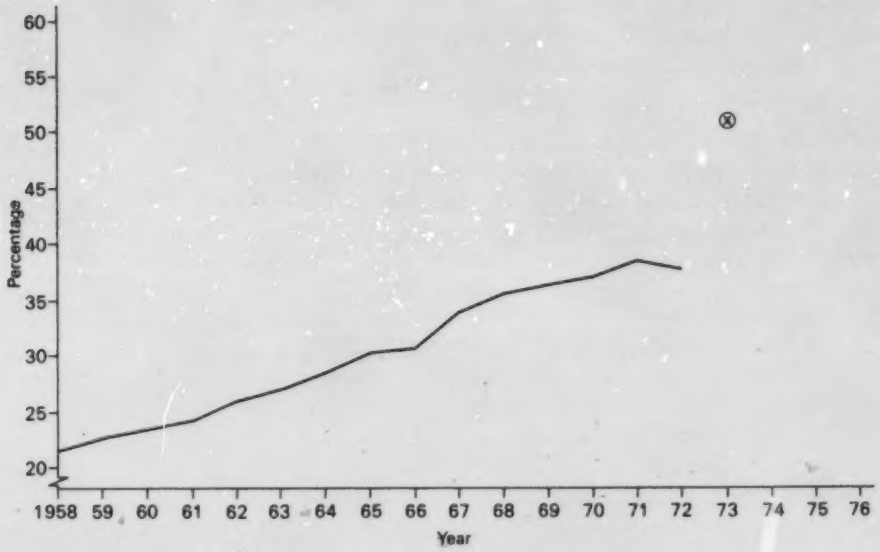

Figure 1 Proportion of 16-year-old boys in school, 1958/9–1973/4

Forecast

2.6 In making an unconditional *forecast* or prophecy, rather than a projection, the statistician is being far less cautious. He is in effect taking a bet on the occurrence of some future event. He is saying that having weighed up all the factors that seem to bear on the variable in question he thinks this or that the most likely outcome. If the word 'forecast' is not qualified an unconditional forecast is usually implied. A forecast of this kind only can obviously be right or wrong.

2.7 Some difficulty is caused by the existence of 'self-fulfilling' prophecies. It is sometimes claimed, for example, that the Robbins Committee's forecast of a big increase in the demand for higher education in the 1960s, and the government's acceptance of it as a basis for planning, was one of the main reasons for the big increase that did take place. Conversely prophecies can be self-defeating. It is sometimes claimed, for example, that the forecasts of massive population increases in the 1960s and people's fears about their consequences were among the reasons why population growth in many countries slowed down. Economic and social policy abounds in self-fulfilling and self-defeating prophecies. A widely believed forecast of a rise in the price of a commodity will bring that rise about as people scramble to buy up existing stocks. Conversely a forecast of a rise in the price of an agricultural product can result in a fall in the price later as farmers grow more of the product in an attempt to make more money.

Target

2.8 A target is the result of looking at the future differently from the ways we have been discussing so far. A target is something that a planner or policy-maker *wants* to achieve. Clearly no confusion should exist between a target, or a goal or objective, and a forecast or projection. Unfortunately such confusions *have* occurred very often in educational planning, and forecasts accepted by a government have become policy objectives. To take an example it might be forecast that by 1980 there will be a demand (according to certain criteria) for 600,000 full-time students in higher education in the early 1980s. If a government accepted this estimate and based its policy upon it the forecast would become a target. You will meet other and more complex examples of forecasts that become targets in Paper 2 of Block II.

2.9 To be a real target and not merely a vague policy objective, a target must be specified in such a way that it is possible to observe whether it has been reached or whether progress is being made towards it. Usually, but not always, this means that the target must be expressed in quantitative terms. To transform the general policy objective 'meeting the private demand for higher education' into a planning target, for instance, 'demand' would have to be defined according to explicit criteria and actual numbers of places to be provided.

2.10 While we can define various ways of looking at the future, we cannot give you an assurance that you will not come across cases where authors use the words in different ways. What is important is for you to appreciate that there are distinct ways in which an educational planner can look at the future: he can extrapolate trends; he can project on various assumptions; he can make an unconditional forecast; or he can set a target. All have their uses in educational policy, and you will meet them all in various contexts during the course.

Self-assessment Question 1

To demonstrate your understanding of the definitions given above and their usage in this text, state which of the following statements involve (a) an extrapolation; (b) a projection; (c) an unconditional forecast; (d) a target.

(i) The world will come to an end in the year 2000.

(ii) Present trends indicate that there will be 600,000 students in British higher education in 1981.

(iii) By the mid-1980s it is aimed to eradicate all class sizes of over twenty pupils.

(iv) North Sea oil will save the British economy.

(v) The Chancellor stated his intention of getting unemployment down to 3 per cent within five years.

(vi) If everybody were to drive their car 5 m.p.h. slower the number of accidents on the roads would drop by 10 per cent.

(vii) If the trends over the past few years continue, there will not be a single book in a British school in 2010.

(viii) The planning model used by local authorities shows that a 10 per cent improvement in the pupil–teacher ratio would require a 5 per cent increase in rates.

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3 Demographic projections

3.1 Estimates of the number of places needed in most branches of education start with forecasts of the population from which all or most of the pupils or students will come. Educational planners normally use the population forecasts produced by the government agencies that specialize in demographic statistics. While the complex and detailed assumptions and calculations necessary for population projections are the domain of the demographic specialist, some acquaintance with the fundamentals of population forecasting is useful for anyone who makes or uses educational projections. The purpose of this section is to outline the techniques of population forecasting.

3.2 All demographic projections are based on forecasts of the number of births and deaths.

The birth rate

3.3 The simplest concept is the *crude birth rate*: a comparison of the number of live births during a year with the average population for that year. The crude birth rate is expressed as so many births per year per thousand of the population. This is the birth rate used in much popular discussion.

3.4 While the crude birth rate has the advantage of being simple to calculate, it has several disadvantages, and a moment's reflection suggests that it is not a good basis for projecting births. For example, the crude birth rate gives the ratio of live births to the total population, although only members of a part of the female population actually bear children. Because of this the interpretation of the crude birth rate will vary according to the age and sex structure of the population. These differ according to past rates of population growth. A country whose population has been growing rapidly will have a higher proportion of young people than one in which the population has been stable for some time. To take these differences into account three concepts of the fertility rate have been developed: the general fertility rate, the age-specific fertility rate and the net reproduction rate.

The general fertility rate

3.5 This rate is the ratio of live births to the number of women of child-bearing age in the population. Women usually included in this group are those aged 15 to 49. Like the crude birth rate, this rate is expressed as the number of births per thousand of the relevant population.

3.6 While the general fertility rate is a more useful measure than the crude birth rate, it does not give a very accurate idea of fertility. Fertility varies with age and is particularly strong in women aged 20 to 30. A woman of 25 is more likely to have a baby in a given year than a woman of 45. Therefore the general fertility rate may vary according to the proportion of women in the population who are between 20 and 30. Because of this, a fertility rate calculated by age is preferred.

Age-specific fertility rates

3.7 Fertility rates can be calculated for each year of age by examining, for example, the ratio of the number of live births by 25-year-old women to the total number of 25-year-old women in the population. Fertility rates of this nature are normally given by age-groups (for example, 15–19 years, 20–24, 25–29, 30–34).

Net reproduction rate

3.8 Another complication in calculating the birth rate can also be allowed for. If young women decide to delay the birth of their first baby, the age-specific fertility of the group (say women aged 20–24) will be reduced. However, these young women may compensate by having more children later on—say when they are in the 35–39 group. Unfortunately it will be fifteen years before statisticians will know whether this compensating increase will occur. In an attempt to deal with this problem the concept of the net reproduction rate has been developed. The net reproduction rate is the average number of *female* children borne by a woman by the time she reaches the end of her child-bearing age. If the net reproduction rate is less than 1, the population is failing to reproduce itself, since the next generation of child-bearing women will be smaller than the current one; if it is greater than 1, the population is increasing. To calculate a net reproduction rate it is necessary to take into account the small number of females who die before the end of their child-bearing age. Most population forecasts in countries that have adequate statistics are based on some variant of the net reproduction rate.

3.9 The main problem with population forecasting, even with a refined concept such as a net reproduction rate, is that the child-bearing behaviour of women fluctuates considerably even over short periods of time. It is thus extremely hazardous to forecast births even a few years ahead. With very long-term birth-rate forecasts, covering twenty years or more, there is the additional problem that errors are cumulative; in twenty years today's incorrectly forecast babies will be having their own incorrectly forecast children. This is not a serious practical problem in educational planning, where rough 25-year forecasts are adequate for most purposes, but it does show the naïvety of people who draw extreme conclusions from very long-term population projections.

Death and mortality rates

3.10 Compared with birth rates, death and mortality rates are easy to deal with. First, deaths are on the whole much more predictable than births. Second, there is very little cumulative effect, since most women die well after the end of their child-bearing lives. Third, while many areas of social planning (and education above all) are concerned largely with people under 25, far fewer are specifically concerned with people over 55. Pensions and parts of the health services are the obvious exceptions. People of different ages and sexes do die at different rates, however, so demographers use 'age- and sex-specific mortality rates' and not the crude death rates of popular discussion.

3.11 Even mortality-rate projections have their problems. Mortality rates in the United Kingdom have declined almost continuously since the middle of the nineteenth century. The rate of improvement appears to have slowed down, however, in recent years, and at some adult ages the mortality rate seems to have slightly increased.

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Assumptions about mortality can be affected both by advances in medical care and by the development of diseases hitherto unrecognized as a problem. For example, the emergence of heart conditions and cancer as the major killer diseases in advanced industrial societies is undoubtedly due in part to the eradication of illnesses that previously masked their real potential incidence.

3.12 It is fairly clear that the younger the group for which provision of facilities is to be planned, the more important are births in relation to deaths. In forecasting the cost of different pension schemes, for example, the most important requirement is an accurate estimate of death rates. Conversely, in planning the growth of nursery education, or even the primary-school building programme and the training of primary teachers, the birth rate is the key factor.

International migration

3.13 The final factor of which some account must be taken by demographic forecasters is migration: both immigration and emigration. If immigrants or emigrants are young, either of school age themselves or of child-bearing age, their arrival or departure can have a considerable effect on the demands made upon schools and colleges. Migration is particularly difficult to forecast, and fluctuates even more than the birth rate. Its size is affected by economic, political and legal circumstances at home and abroad, and any estimates of long-term migration patterns are, at best, informed guesses. However, at the national level, migration, although much publicized, accounts for only a small part of population changes. At the local level, it can be more important to take migration into account in any attempt to estimate demand for educational facilities. Immigrants tend to be concentrated in particular areas so that in some districts a very small percentage, in terms of the national school population, can be a high proportion of the total educational requirements.

Internal migration

3.14 More important still, however, in educational policy is internal migration between different parts of the country. National population changes conceal varying rates of change in different parts of the country, with some regions gaining population and others losing it. Often such differences are very localized—for example, when there are movements from city centres to suburbs. Usually these movements have broad economic and social causes. However, educational facilities themselves can occasionally cause people to move from one place to another if one district is believed to have particularly good schools.

3.15 Once the number of births is known, forecasting the number of pupils to be catered for in the various branches of compulsory education is straightforward. In the developed world mortality rates for people under sixteen are very low and extremely stable. The main difficulties in forecasting primary-school population up to five years ahead, as in forecasting the population of secondary-school children under the minimum school-leaving age eleven years ahead, are caused by internal and external migration and by the different rates of population growth in different parts of the country. Both primary and secondary schools serve very specific local areas, and school buildings must serve the needs of their own catchment areas, where population trends may differ markedly from the national figures.

4 Population projections in the United Kingdom

4.1 The Government Actuary's Department, which since 1968 has been part of the Office of Population Censuses and Surveys (OPCS), has been making estimates of the future population of the United Kingdom since the 1920s. In recent years a single projection has been published each year with the objective of providing a common estimate for use in a variety of planning activities. This projection is based on the assumptions that appear most reasonable when the projection is made. It is claimed by the Government Actuary that although a single projection is made, this does not mean that it is a forecast of the future. It has been suggested by critics of this method that a range of projections might be more appropriate, each one based on different assumptions, since making accurate predictions of what amounts to changes in individual behaviour or social structure is impossible.

4.2 The Government Actuary considers it more useful, however, to produce a single 'best estimate' projection to encourage consistency among all those likely to make use of it. It has to be recognized that assumptions about future populations and, more specifically, about educational provision are almost certain to be proved wrong by events, but, as we have said, all assumptions adopted are considered the most reasonable when they are made. In this sense, therefore, the regular projections published by the OPCS are forecasts in the sense we have defined above (paragraph 2.6).

Revision of projections

4.3 It is evident that population projections have to be revised when there are changes in the level or direction of migration, fertility and mortality. Any changes thought to be permanent need to be included in these revisions. Figure 2 compares the projection made by the Government Actuary in 1973 with four projections made since 1955. It is noticeable that even small changes between one year and another can, when extrapolated to the end of the century, result in very large differences in population projections. Such large differences within a very short period make planning long-term provision of education facilities exceedingly difficult.

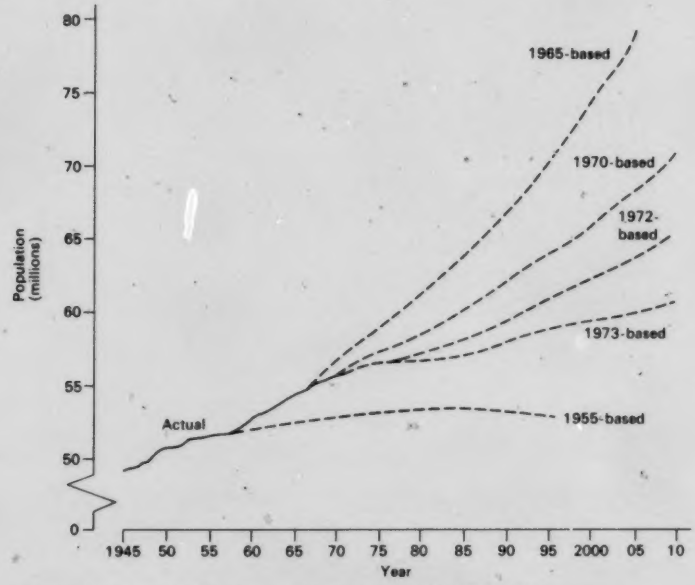

Figure 2 Actual and projected population of the United Kingdom

SOURCE: (1974) *Population Projections No. 4, 1973–2013*, Office of Population Censuses and Surveys, London, HMSO.

Self-assessment Question 2

The difference between the 1972- and the 1973-based projections resulted from the modification of certain assumptions. Suggest some modifications to the assumptions made in 1972 that could have caused the lowering of the projected population from 63.0 million to 59.6 million in the year 2001.

A dilemma for the demographer

4.4 Figure 3 shows actual and projected live births in the thirty years after the Second World War. The diagram shows the problem faced by all who are concerned with forecasting on the basis of trend projections. In 1964 the number of live births had been rising, with minor fluctuations, for ten years. Confronted with a reduction in the number of births in 1965, forecasters not unnaturally treated it as another minor fluctuation and the 'official' forecast assumed that the 1954–64 trend would continue. By 1972 it was apparent that something more than a minor fluctuation was occurring, but it still seemed unreasonable to project a long-term decline in the number of live births. Projected indefinitely, the 1964–72 trend suggests that the last British baby will be born in about 1986—clearly an unlikely proposition. By 1973, however, with the downward trend continuing, it seemed reasonable to the demographers to assume that it would continue for at least a few years more. It seems almost certain that there is a level below which man's biological instincts will not allow the birth rate to decline. But so far there is little indication of what this level is or of whether it will result in a rising, a stable, or a falling overall population.

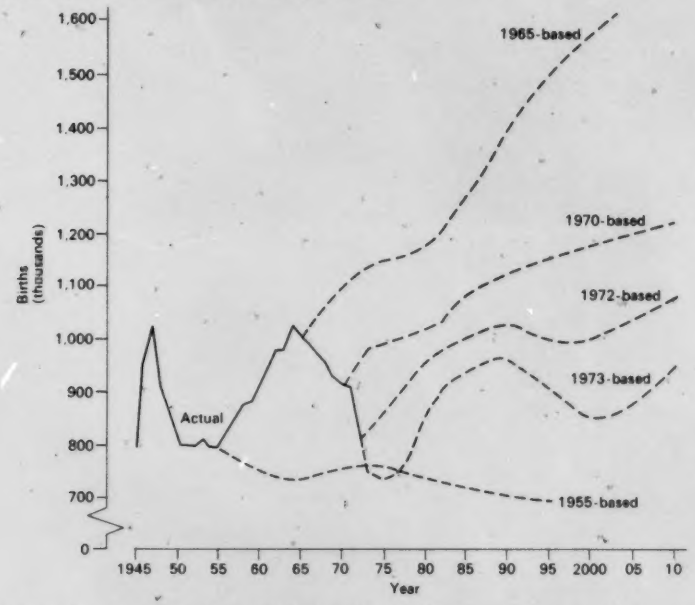

Figure 3 Actual and projected live births—United Kingdom

SOURCE: (1974) *Population Projections No. 4, 1973–2013*, Office of Population Censuses and Surveys, London, HMSO.

We shall discover that the problems associated with interpreting deviations from a trend have to be confronted in many areas of educational policy. You should never forget when evaluating projections and forecasts made in the past that you have the benefit of hindsight. You can illustrate the difficulty to yourself by putting a card over Figure 3 so that everything from 1964 onwards is covered up. Move the card one year forward and decide how you would interpret the trend that confronts you. Repeat the exercise for each year up to 1974. In the next paper you will be asked to do a self-assessment question of a similar type.

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Projections and decisions about resource allocation

4.5 Figure 3 highlights another important practical problem in educational planning. The aim of the educational planner should be to provide enough places for all the pupils who will be seeking them with as little waste of national resources as possible. If he were concerned *only* with providing a place for every pupil who might want one he would base his plans on the highest possible estimate of the number of pupils. In so doing he would run a considerable risk of creating excess capacity and hence wasting resources that could otherwise have been put to other desirable uses, such as hospital- or house-building. Conversely if a planner wanted to avoid wasting resources, regardless of any hardship this policy might cause, he would select the population forecast at the bottom end of the range. Pursuing either extreme might be considered irresponsible; the art of educational planning must include minimizing the costs to society of being wrong about the future as well as making the best possible projections.

4.6 As we shall see later, these considerations apply with even more force to such issues as staying-on rates (students going beyond compulsory education), in which the educational planner has to make his own forecasts, than to demographic forecasts, which are usually given to him from outside.

Population changes

4.7 Population fluctuations create other difficulties for educational planners. If it is known that a population bulge will be succeeded by a lower birth rate and subsequently smaller age-groups, provision of all the places made necessary by the bulge will mean excess capacity once the population bulge has passed through the education system. Even more complicated is the problem of establishing reasonably stable career patterns for teachers when the school population fluctuates. Rapid growth means high recruitment and early promotion; subsequent slower growth means low recruitment and promotion blockages.

4.8 One of the most important features of any educational planning machinery is that adequate provision for frequent updating and revision should be built into it. This provision will help to minimize the damage that can be done by incorrect forecasts, since 'wrong' decisions taken in one year can be allowed for in policies for the next. Before turning to the next section you should answer the following questions to see whether you have understood the essential demographic concepts relevant to educational planning.

Self-assessment Question 3

(i) What problems do you think might ensue if OPCS published a range of population projections each year?

(ii) What are the main concepts on which population projections are based?

(iii) Why is it difficult to detect quickly a change in the birth-rate trend?

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5 The private demand for education

5.1 We have introduced some of the main factors to be taken into account by those responsible for predicting the size of the school population and have considered briefly the implications of population changes for the future provision of educational facilities. We now look in more detail at the private demand for education.

5.2 For compulsory education, the concept of private demand is rather artificial. Once the population of the relevant age is known the overall 'demand' by individuals is also known. In Britain, because of current legislation, all children between their fifth and sixteenth birthdays must demand education. There are of course complications. As we have seen population changes are not uniform throughout the country. Moreover some parents will be prepared to pay for private education for their children; while others will want special provision in denominational schools. Finally, a policy of 'roofs over heads', as it has come to be called, providing an education of some kind for every child, says nothing about the quality of the provision—for example, the pupil–teacher ratio; the quality of school buildings; the amount of equipment for each pupil. Such issues of quantity and quality need to be resolved, but our focus here is on the total number of pupils for whom places need to be provided.

Forecasting the need for places in post-compulsory and compulsory education

5.3 There are two ways in which it is easier to forecast the demand for higher education than to assess the amount of school building and teacher training necessary for legal compulsory education. First, higher education does not begin until young people are at least 18, and forecasts of the potential demand for up to eighteen years ahead will be unaffected by the vagaries of the birth rate. Second, since young adults entering higher education are geographically more mobile than younger pupils, for many purposes aggregate national forecasts are adequate; in primary and secondary education, on the other hand, schools have to be provided in the localities in which the pupils live, so that local forecasts are necessary.

5.4 In other ways, however, planning the provision of higher education is more difficult than meeting the statutory requirements for primary and secondary education. Higher education is not a homogeneous activity. The system of higher and further education comprises a large number of different institutions providing a wide range of specialist courses. In the late 1960s and early 1970s, for example, there were more places than were needed in many science departments and not enough in some social science departments.

5.5 The greatest problems for the educational planner, however, stem from the fact that higher education is voluntary, and that entrants to it all have to undergo at least two years of non-compulsory education before they start. The rest of this paper and the next paper explore the private demand for higher education and the factors that influence it.

Transitions

5.6 At the end of their compulsory education pupils can do one of four things. They can stay full time at the same school, go full time to another educational institution, study part time or leave education altogether. Many factors are likely to influence their decisions, among them achievement at and enjoyment of school, the benefits

perceived from staying on and the financial circumstances of their families. Pupils are faced with these choices throughout their period of voluntary study. However, there is another point at which large numbers of pupils and students have to make a choice similar to that at the end of compulsory education. At 18 or thereabouts, when their secondary education ends, pupils who want to continue their studies must normally move to a university or other institution of higher education. The age of entry to post-secondary education corresponds in Britain and in an increasing number of countries to the age of majority at which young people are deemed to have all the rights and responsibilities of adults. This strengthens our interpretation of private demand for higher (and advanced further) education as a genuine economic demand. In the last analysis people attend post-compulsory education institutions because they think that the benefits they will receive will exceed the costs they incur. Of course it may often be parents rather than children who take the decision. We cannot ignore the influence and importance of parents in the decision-making process, since although legal adult status is attained at age 18, some measure of financial responsibility can rest with parents until the young person is 25, given the present grants structure in the United Kingdom.

The Robbins Committee

5.7 Intermittent attempts have been made to forecast the demand for higher education in Britain at least since the end of the First World War. The number of such forecasts increased considerably during the 1950s, possibly as a result of the opening up of secondary education to a wider cross-section of the population by the 1944 Education Act, which created the basis for a greatly increased private demand for higher education. However, serious systematic attempts to plan the provision of places in higher education began only with the work of the Robbins Committee in the early 1960s.

5.8 The Committee of Enquiry into Higher Education under the Chairmanship of Lord Robbins (Lionel Robbins, the economist) was set up in 1961 by the Prime Minister, Mr Harold Macmillan, with the following terms of reference:

> to review the pattern of full-time higher education in Great Britain and in the light of national needs and resources to advise Her Majesty's Government on what principles its long-term development should be based. In particular, to advise, in the light of these principles, whether there should be any changes in that pattern, whether any new types of institution are desirable and whether any modifications should be made in the present arrangements for planning and co-ordinating the development of the various types of institution.[4]

The Committee took as its first task the establishment of a criterion on which the future provision of higher education should be based. It explored various possibilities. Several criteria including the provision of places on the basis of estimated future needs for qualified manpower by the economy were considered, but the Committee came down in favour of what it called the axiom that 'courses of higher education should be available for all those who are qualified by ability and attainment to pursue them and who wish to do so'. After the Robbins Report was published in 1963, this guiding principle was the main basis for the provision of higher education in Britain. (The question of the country's needs for qualified manpower is dealt with by Maureen Woodhall in Paper 2 of Block II.)

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6 Forecasting the demand for higher education

6.1 The first task of the Robbins Committee was to turn its guiding principle into an operational rule so that the principle could be converted into numbers of student places.

> The actual process by which we achieve our estimate of places needed for home students is complex . . . The separate stages of the calculation are as follows:
>
> (i) We first look at the size of the age groups relevant to higher education.
>
> (ii) Then we estimate what proportions of these age groups are likely to reach the level of attainment appropriate for entry.
>
> (iii) We next consider how many of those so qualified should be assumed to enter. This in effect involves two assumptions:
>
> (*a*) how many will try to enter higher education (the application rate);
>
> (*b*) what proportion of applicants with given attainments should be given places (the degree of competition).
>
> (iv) Finally, we decide on assumptions about the future length of study.[3]

6.2 Steps (i), (ii) and (iii*a*) involved a forecast—an assessment of the likely course of events. Step (iii*b*) required the members of the Committee to make their own value-judgements about what *ought* to happen. The 'assumptions' referred to in (iv) had the effect of keeping the length of courses the same as before. In general the words 'should' or 'ought' in statements of this kind indicate that a value-judgement is involved and that, in our terminology, the statement is in some sense a target.

6.3 In the view of the Committee:

> The second stage is by far the most complex . . . we have based ourselves as securely as possible on recent trends in the proportions of the age group staying on at school and gaining the various leaving qualifications, but there are many social and economic factors, as well as changes of educational policy, that may alter these trends in the future. We must also emphasise that our projections are throughout based upon the continuation of present policies regarding student maintenance (Robbins Report, p. 55, para. 150).

6.4 The 'relevant age-group' for stage (i) of the exercise was to all intents and purposes the group of people aged 18, the age at which most people enter higher education. The concentration of entrants around the age of 18 was more marked in the early 1960s that it is in the mid-1970s.

6.5 For step (ii) of the projection, the main indicator of the demand by individuals for higher education used by the Robbins Committee and in subsequent Department of Education and Science planning documents is the 'flow of people' with GCE A-level qualifications. This 'flow' consists mainly of school-leavers, although it includes a small but growing proportion of students who obtain GCE qualifications in further education colleges.

Reading 1 You should now read paragraphs 147 to 164 in the extract from Chapter VI of the Robbins Report. This will tell you in the Committee's own words how it dealt with the four steps outlined above.

Entrance requirements

6.6 You will have noticed that the Robbins Committee used a number of different qualification levels in its analysis. There are, of course, many ways of classifying examination results: by grades achieved, passes, or subject-matter. For monitoring and projecting the demand for higher education a convenient focus is that part of the 'flow' which consists of people with two or more passes in GCE A-level examinations. For Scotland we may consider, as the Scottish Education Department does,

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three or more passes in the higher grade of the Scottish Certificate of Education as equivalent. A single indicator avoids the necessity of projecting and monitoring a large number of different trends.

6.7 In addition, the great majority of qualified school-leavers in the age-group relevant to higher education obtain two or more GCE passes at A level (or the Scottish equivalent). Moreover the proportions with different grades of passes do not vary greatly from year to year. Finally, it is the normal minimum requirement for a mandatory student grant.

6.8 Between 1964 and 1970 the Department of Education and Science published regularly updated projections of this basic indicator. At the time of writing in 1976 no further projections have been published, and to guess what has been in the official mind we have to work backwards from the revised targets of student numbers in the early 1980s that have been published from time to time.

Flow of students with GCE A Levels

6.9 Figure 4 shows for 1954 to 1968 the annual flow of people in England and Wales with two or more A-level passes. The flow is expressed as a percentage of people in

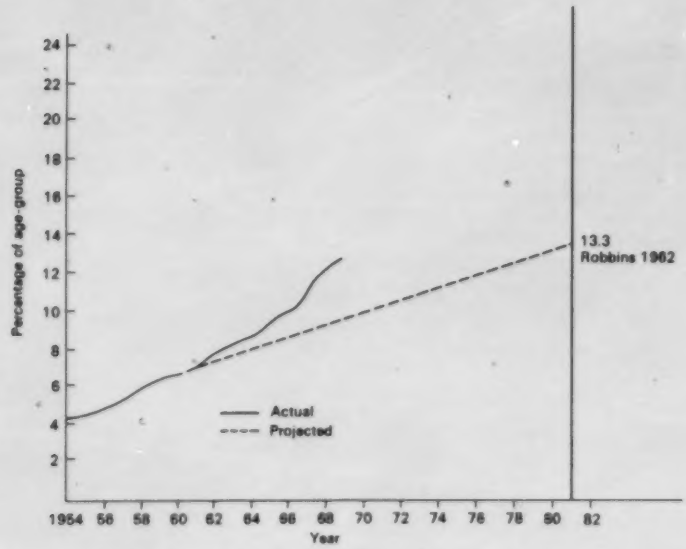

Figure 4 Actual and projected percentages of age-group obtaining two or more A levels (men and women) England and Wales

NOTES

(1) Observations (percentages of age-group)

Robbins Report, Appendix One, Part IV, Table 10							*Statistics of Education* Vol. 2, 1966, Table 25						*Statistics of Education* Vol. 2, 1972, Table 23	
1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
4.3	4.5	4.8	5.3	5.7	6.2	6.6	6.9	7.6	8.0	8.3	9.2	9.6	10.9	11.9

(2) Projections

Robbins Report, Appendix One, Part IV, Table 10

SOURCE: DES (1970) *Student Numbers in Higher Education in England and Wales*, Education Planning Paper No. 2, London, HMSO, Tables 1 and 3.

the relevant age-group. The diagram also shows the projection made by the Robbins Committee in 1962 in which the trend rate of growth was continued to 1981. You will see that by 1968 the proportion of young people getting two or more A levels was considerably higher than the Committee's projection.

6.10 You are invited to examine Figure 4 and suggest what projection you might have made if in 1970 you had been trying to forecast this indicator of the demand for higher education. You should note that it always takes one or two years for the collection and collation of statistics of this kind. Thus a projection made in 1970 would be based on information up to 1968.

6.11 Now turn to Figure 5, where you will see the projection published by the Department of Education and Science in its Education Planning Paper No. 2 entitled *Student Numbers in Higher Education in England and Wales*. If your estimate differed by more than a few percentage points you are invited to pause for a moment to consider why. Did you give more or less weight than the DES statisticians to the accelerating growth of the mid-1960s? Were you tempted to make use of information about later trends that you have acquired from other sources since 1968? Now you should turn to Figure 6 where the picture is completed to show what happened between 1968 and 1974.

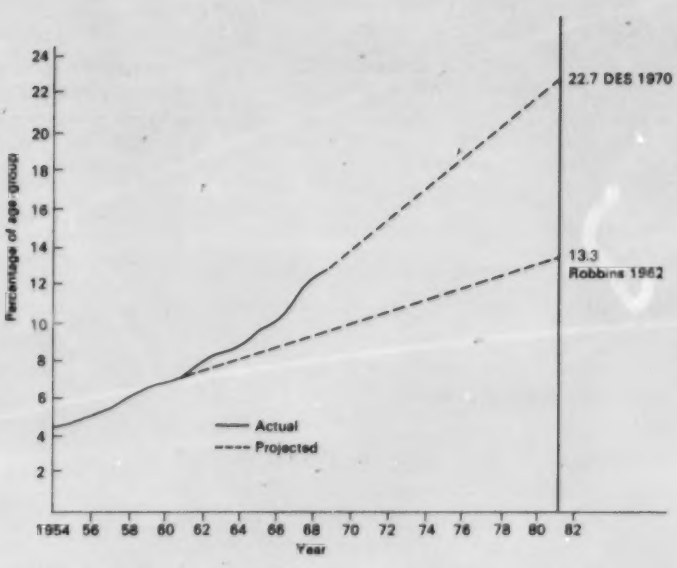

Figure 5 Actual and projected percentages of age-group obtaining two or more A levels (men and women) England and Wales

NOTES

(1) Observations (percentages of age-group)

Robbins Report, Appendix One, Part IV, Table 10							*Statistics of Education* Vol. 2, 1966, Table 25						*Statistics of Education* Vol. 2, 1972, Table 23	
1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
4.3	4.5	4.8	5.3	5.7	6.2	6.6	6.9	7.6	8.0	8.3	9.2	9.6	10.9	11.9

(2) Projections

Robbins Report, Appendix One, Part IV, Table 10

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SOURCE: DES (1970) *Student Numbers in Higher Education in England and Wales*, Education Planning Paper No. 2, London, HMSO, Tables 1 and 3.

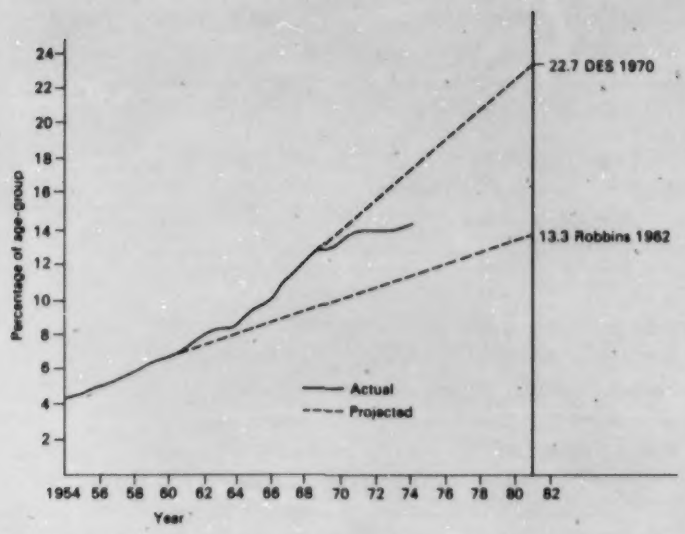

Figure 6 Actual and projected percentages of age-group obtaining two or more A levels (men and women) England and Wales

NOTES

(1) Observations (percentages of age-group)

Robbins Report, Appendix One, Part IV, Table 10							*Statistics of Education* Vol. 2, 1966, Table 25						*Statistics of Education* Vol. 2, 1972, 1973, Table 23; 1974, Table 22							
1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
4.3	4.5	4.8	5.3	5.7	6.2	6.6	6.9	7.6	8.0	8.3	9.2	9.6	10.9	11.9	12.7	13.3	13.9	13.9	14.0	14.0

(2) Projections

Robbins Report, Appendix One, Part IV, Table 10

SOURCE: DES (1970) *Student Numbers in Higher Education in England and Wales*, Education Planning Paper No. 2, London, HMSO, Tables 1 and 3.

6.12 You will now probably begin to sympathize with the DES statisticians who at the time of writing had published no further explicit projections of this indicator since 1970. Although they were at pains to point out in the introduction to Education Planning Paper No. 2 that the figures were projections or conditional forecasts, many commentators treated them as forecasts and even as official planning targets. The figure of 835,000 full-time students in higher education in Great Britain by 1981, derived from the 1970 projection, was a constant embarrassment to the DES, as declining demand for higher education led to frequent downward revisions of the figure during the following few years. However, it is to be hoped by all those with a serious interest in educational policy that this embarrassment will not stop statisticians from making explicit projections. It may be unpalatable to be proved wrong time and again, but the regular publication of such projections does provide an invaluable planning tool—a yardstick against which developments can be measured.

6.13 We discussed earlier, in relation to variations in the number of births, the difficulties encountered when planners are faced with a change of trend. Figure 6 illustrates one of the main practical problems faced by those concerned with providing a reliable quantitative basis for policy on post-compulsory education. What weight should they put on the slackening trend of the 1970s compared to the accelerating growth of the 1960s?

6.14 There is no 'right' answer to such a problem before the event. After the event, some solution will prove to have been 'right', since of all the things that could have happened, only one will take place. This is always the advantage of hindsight, but it is of little use to those who have to make decisions in advance. 30

Models

6.15 What the planner needs is a model or systematic explanation of the phenomenon being considered. An educational model is an attempt to construct an abstract representation of what is happening in the real educational world. If the model corresponds closely to events, we can change the values of some of its component variables, and thence infer the likely impact such changes would have on the real education system. Models can present problems, however. If they are very simple, they run the risk of glossing over important features of reality that need to be taken into account if predictions are to be reliable. If they are very detailed and complex, the statistical information needed to test their validity or to provide a basis for policy-making may not be available. Further, the more complex the model the more indicators there are to monitor, and the less easy it is to decide whether the system is maintaining course.

The virtue of the Robbins Committee projections and those made subsequently by the DES statisticians is that they are based on a very simple model of school-leavers' behaviour. The projections, and the plans based on them, can be monitored by observing the progress of a very few key indicators, of which the number securing A-level qualifications is the most important. Of course, such a simple model has limitations since it cannot include all the variables that affect demand.

6.16 The essential feature of a model of a higher-education system is a 'mechanism' or 'organism' (both terms are metaphors) by which the proportion of the population qualifying for higher education this year is related to the proportion qualifying last year. Various such mechanisms could be used. A common one, until it was disproved by Robbins, was that 'the growth in the number of those able to benefit from higher education is something that is likely to be limited in the foreseeable future by biological factors' (Robbins Report, p. 49). According to this 'pool of ability' model, the proportion qualifying for higher education this year would be much the same as last year, next year, and so on. In the early 1960s, Kingsley Amis, the novelist, coined the phrase 'more means worse', claiming that the expansion of higher education would make facilities available to students who would not benefit from them as much as earlier students had done, and that the general excellence of higher education would be diluted by the enrolment of lower-ability students. This sort of claim derived from the 'pool of ability' concept.

The Robbins Committee did not see the possibility of a shortage of potential ability as a problem. It preferred an alternative model, that very large numbers of people could and would qualify for higher education, but are held back by social, economic and institutional constraints. If these are removed, the number of qualified school-leavers will rise accordingly.

Optional Reading If you wish to pursue the role of projections and models in educational planning read the article by P. Armitage, 'An introduction to some educational models and their applications' in *Decision-making in British education.*

Robbins projections

6.17 The Robbins Committee projections and the official ones made subsequently by the DES have relied almost entirely on linear extrapolation of percentages of the relevant age-group. The proportion of people who will qualify for higher education this year will be equal to the proportion who qualified last year plus a certain amount. The proportion qualifying next year will be equal to this year's proportion plus the same amount, and so on. Broadly this is the procedure that gives the linear projections shown in Figure 5.

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6.18 This method means that the projection underestimates student demand for higher education when growth is accelerating, as it was after the publication of the Robbins Report. Conversely the projection is an overestimate when growth is slowing down, as in the early 1970s. However, this method of forecasting cannot tell us whether growth *in the future* will accelerate, decelerate or remain constant.

Reading 2 You should now read the article 'The impact of Robbins' by Richard Layard and John King. The article examines the rapid growth of higher education from the launching of the Robbins Report until 1966–7 and looks at some of the main indicators of demand introduced in the Robbins Report and mentioned in the course text. It also gives an account of the reception of the report upon publication. From reading this article you should gain an understanding of these issues and have some idea of the way in which the Report could be criticized.

Self-assessment Question 4

(i) What is the 'bulge' and what is the 'trend' referred to in the article?

(ii) Why was the Robbins Committee set up?

(iii) How, in general, was the publication of the report received, and on what grounds was the Report criticized?

(iv) In what respects was the Robbins projection of student numbers different from the actual numbers?

Reading 3 The article by Layard and King describes the development of higher education in the first half of the 1960s; the first part of Gareth Williams's paper 'The events of 1973–4 in a long-term planning perspective' traces this development to the mid-1970s. You should now read the first ten pages of this paper fairly quickly.

Other indicators of the future demand for higher education

6.19 So far we have concentrated on two or more passes at GCE A level (or their Scottish equivalent) as the basic indicator of the demand for higher education. This indicator derives from the planning procedures developed by the Robbins Committee and used subsequently by DES statisticians and in the articles you have just read. There are others. An important one is the proportion of pupils continuing their education beyond the minimum legal leaving age. Unless pupils continue their education beyond 16 they are unlikely to obtain A-level qualifications. Staying-on rates might thus be expected to give an earlier indication of the demand for higher education than the proportion of the population obtaining A-level qualifications.

6.20 Since the decision to stay on or to leave school is taken two years earlier than the decision to try for a higher-education place, this indicator could provide early warning of possible changes in trends. However, as Figure 7 shows, this has not worked out quite so simply in the past.

6.21 Clearly a close similarity exists between the general patterns of growth of staying on after the end of compulsory education and of leaving school with two or more A-level passes. However, the relationship cannot be the simple one postulated in the last paragraph. If it were, changes in the A-level leaving proportions would occur at the end of the school year following the one in which the pupils are 16. In fact the A-level plateau of 1970–1 seems to have *preceded* the possible downturn in staying-on rates.

6.22 What we must infer from Figure 7 is that another factor or other factors must have caused the slackening of both the proportion of A-level leavers and the rate of staying

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on; the latter cannot have been a direct cause of the former. Before we return to this question in the next section, suggest some explanations of your own for these changes. You should write any possible factors influencing demand on a separate piece of paper before reading the next paper in this block, where a detailed answer is given.

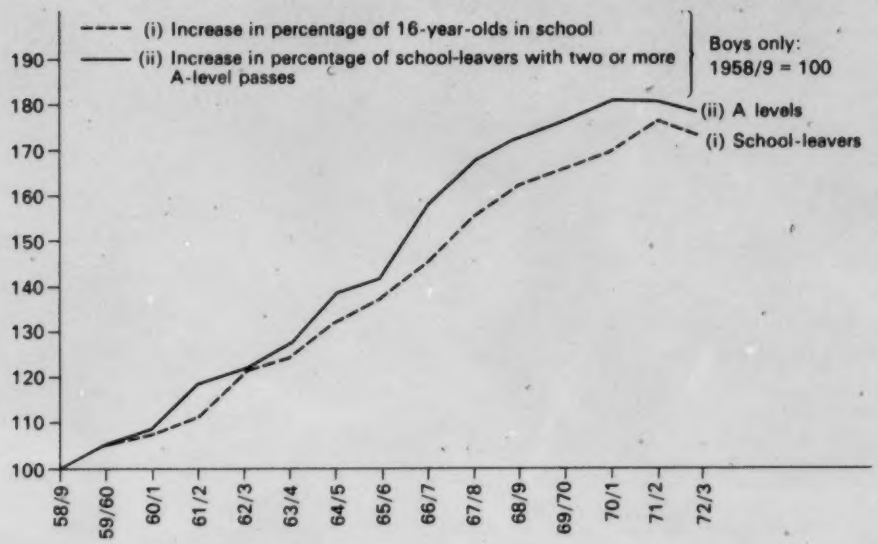

Figure 7

6.23 After examining the proportion of leavers with two or more GCE A levels, the next step in forecasting the private demand for higher education is to estimate what has been called the 'willingness rate'. This is the proportion of qualified school-leavers who actually enter higher education. The 'willingness rate' for Great Britain, based on school-leavers with two or more A-level passes, or three of the Scottish equivalent, is shown in Table 1 below. The rate is calculated by dividing the total home entry of students under 21 by the number of school-leavers qualified for entry. This rate does not include those entering higher education without conventional entry qualifications.

TABLE 1 'Willingness rates' of entry to higher education by qualified school- leavers,* Great Britain, boys and girls combined

Leavers in	Percentage†
1967	92
1968	97
1969	96
1970	97
1971	95
1972	89
1973	89
1974	87
1975	90

* Leavers with two or more A-level passes (England and Wales) or three or more 'Highers' (Scotland).

† Percentage entering higher education.

6.24 Again we see a rise up to 1970 followed by a fall for a few years. This implies that from 1970 onwards not only did the growth in the proportion of school-leavers with A levels cease, but a lower proportion of those with A levels decided to enter university. Of course, the 'willingness rate' can be interpreted in this way only if there is capacity in higher education for all those who want places. If not, changes in the percentage of qualified people entering higher-education institutions reflect changes in the supply of places rather than changes in the demand for them. 33

6.25 In addition to the key concepts of 'staying-on rates', 'qualified school-leavers proportions' and 'willingness rates', a number of other indicators of private demand are suggested even by a model as simple as that developed by the Robbins Committee. All models need to distinguish between boys and girls since, until now at any rate, the two sexes have exhibited different behaviour patterns at key points of transition within the education system. For many purposes it may also be useful to have separate information for children from different social backgrounds, if we believe that this affects their demand for higher education. Another key variable in the past has been type of school attended. The growth of comprehensive secondary education has lessened its relevance, but separate indicators for further-education colleges and ordinary schools are useful, and as are, where possible, separate indicators for the private sector of education.

7 Summary

7.1 While any discussion of the private demand for education must begin with the projection and interpretation of population changes, in post-compulsory education other concepts are also important. In this paper we have examined the techniques used to project the private demand for post-compulsory education in the past, with special reference to the Robbins Committee methods of estimating future student numbers. In the next paper we turn our attention to factors that have been used to explain what we have called the 'willingness rate', that is, influences on the private demand for education.

Self-assessment Question 5

To illustrate your understanding of the Robbins method of calculating the expected number of new higher-education entrants in the future, use the following information to calculate new entrants in 1981 in the fictitious country of Ruritania. Calculate for boys and girls separately.

(i) The size of the age-group relevant to higher education in 1981 will be 442,000 boys and 420,000 girls.

(ii) The proportion of the age-group achieving the minimum higher-education entry qualifications is one in five boys and one in four girls.

(iii) Assume that 85 per cent of boys and 75 per cent of girls who achieve the entry qualification will apply for higher education.

(iv) Of those who apply, assume that 55 per cent of boys and 50 per cent of girls will subsequently enter.

Answers to self-assessment questions

Self-assessment Question 1

(i) (*c*)
(ii) (*a*) or possibly (*b*)
(iii) (*d*)
(iv) (*c*)
(v) (*d*)
(vi) (*b*)
(vii) (*b*) or possibly (*a*)
(viii) (*b*)

Self-assessment Question 2

A number of changes had occurred that would move the projected population both up and down, but the overall impact would be to reduce it. The differences between the assumptions in 1972 and those in 1973 were:

(i) Because of recent experience in the UK and abroad, less improvement in the mortality rate was assumed for people under 60 and the base level of mortality was slightly increased.

(ii) In the light of recent fertility trends the projected number of births was substantially reduced.

(iii) It was assumed that future net emigration would be at a lower level than that assumed in the 1972 exercise.

While the third change would push the population projection up, its impact would be insufficient to offset the reductions generated by the first two changes, so that the total projected population would be reduced.

Self-assessment Question 3

(i) Plans for the future based on different projections would not be consistent and would lack planning coherence. Politicians might choose the projection that suited their policies best: for example, the lowest estimate if they want to reduce public expenditure. Teachers' unions might use the highest forecast in discussions over teacher supply.

(ii) Answer contained in course text.

(iii) Delays in publishing figures. Problems of separating short-term fluctuations from changes of trend. Lack of explanatory model.

Self-assessment Question 4

(i) The 'bulge' is the increase in the size of the age-group due to the post-war 'baby boom'. The 'trend' is the increase in the proportion of the age-group gaining school-leaving qualifications.

(ii) To look at the problems surrounding the growth in the demand for higher education as a result of 'bulge' and 'trend'.

(iii) The government promised to act immediately on the recommendations of the report, and the public reception was also, on the whole, favourable.

(iv) The Robbins estimates of the trend to stay on at school were fairly accurate, especially to the mid-1960s. However, estimates of the number of school-leavers with higher-education entry qualifications proved too low almost immediately.

Self-assessment Question 5

Step 1

We are told that one in five boys (20 per cent) and one in four girls (25 per cent) are assumed to achieve the minimum entry standards. Thus:

$(1/5 \times 442{,}000)$ boys and $(1/4 \times 420{,}000)$ girls will obtain the necessary entry qualification—i.e. 88,400 boys and 105,000 girls.

Step 2

Of those achieving this level of qualification 85 per cent of boys and 75 per cent of girls will apply for higher-education places. Thus:

$(85\%$ of $88{,}400)$ or $(\frac{85}{100} \times 88{,}400) = 75{,}140$ boys, and

$(75\%$ of $105{,}000)$ or $(\frac{75}{100} \times 105{,}000) = 78{,}750$ girls will apply for higher education. (You may have needed your calculator for this step!)

Step 3

Now we know how many boys and girls are expected to apply, it is easy, given the success rates in this fictitious country, to work out the number of entrants. Thus for boys, 55 per cent of applicants will be successful, i.e.

$(55\%$ of $75{,}140)$ or $(\frac{55}{100} \times 75{,}140) = 41{,}327$ boys. Using the same process for girls, among whom 50 per cent of applicants will be successful, gives

$(1/2 \times 78{,}750)$ entrants $= 39{,}375$ girls.

To get the total of entrants we add the numbers to give 80,702 entrants in 1981. However, not even the most ardent believer in this type of futurism would believe that you could forecast to the nearest single entrant, so some type of rounding off must take place, with entrants given as 80,700 or 81,000.

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FACTORS INFLUENCING THE DEMAND FOR HIGHER EDUCATION

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prepared by Alan Gordon and Gareth Williams

Objectives

At the end of this paper you should be able to:

- understand the meaning of a demand function;
- use the demand function to interpret changes in the demand for higher education;
- assess the merits of alternative explanations of changes in the demand for higher education and apply this to an evaluation of alternative policies for dealing with such changes;
- proceed to the more rigorous and detailed discussion on the value of economic analysis to educational planning that is pursued throughout the course structure.

1 Foreword

1.1 In Paper 2 we discussed the private demand for higher education in purely mechanical terms, as if the personal preferences of young people and their parents and the complicated considerations in their minds when they take critical decisions about their future education and careers were merely statistical abstractions. Furthermore, in concentrating on the demand for higher education by school-leavers we have ignored such matters as the rapidly growing number of adults doing courses of higher education in the Open University and elsewhere. These cannot easily be linked to any one age-group.

Now it is time to ask why people want to go on to higher education. Here, therefore, we examine some of the behaviour patterns that may lie behind the trends we have been observing, thus focusing our attention on one aspect of demand—the 'willingness factor' introduced at the end of the last paper. In Paper 3 we introduce these influences in the form of what economists call *a demand function*, and follow on with a discussion of the individual items that make up the function.

1.2 Before we begin we should make it clear that our concern here is with aggregates—with groups of students, not individual students. We are not concerned primarily with why John Smith does or does not go to a university, but rather with the circumstances in which the proportion of a population of John Smiths seeking higher education rises from, say, 10 per cent to 15 per cent. Clearly there is some relationship between individual preferences and the behaviour of groups of individuals, but unless all individuals have exactly the same preferences it is changes at the margin, by individuals who may not be typical, that result in changes in the proportion seeking higher education.

2 The demand function

2.1 The simplest form of demand function is the ordinary demand curve, one of the basic tools of economics. The curve may be expressed thus:

$$\left.\begin{array}{l}\text{The amount of}\\ \text{product purchased}\end{array}\right\} \text{depends upon} \left\{\begin{array}{l}\text{the price of}\\ \text{the product.}\end{array}\right.$$

This means that if the price of the product goes up, the higher price will put some people off and less will be bought; the reverse will happen if the price goes down. We can show this simple relationship in the form of a demand curve: see *DD* in Figure 8. If we are dealing with the product beef, we can examine the accounts of

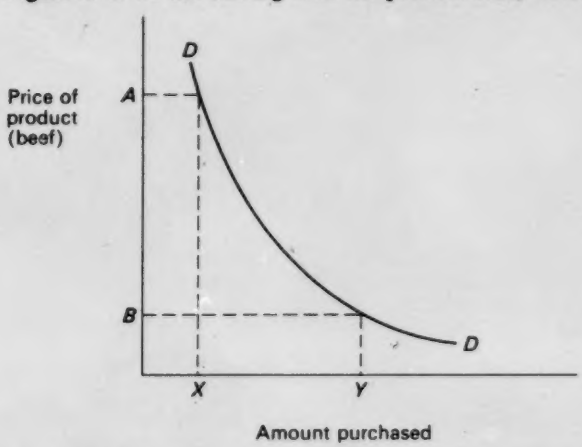

Figure 8

butchers' shops and show that, other things being equal, less beef is bought at a high price than at a low price. For example, at price *A*, *X* units are bought, at the lower price *B*, *Y* units are bought.

2.2 Of course many factors affect the amount of a product purchased, whether it be beef or higher education. Some of the more important of these are outlined in this paper. When they start looking at the demand for a product, however, economists hold constant all other influences on demand and concentrate on the influence of price. This has been done in the demand curve (Figure 8). Economists call this the 'all things being equal' or *ceteris paribus* assumption. We pretend that price is the only influence on the demand for beef at this stage, and only afterwards introduce other influences. It should be noted that a demand curve usually goes from the top left-hand corner to the bottom right-hand corner of the graph, showing that less is bought at a higher price than at a lower price. However, the steepness and shape of a demand curve will differ for different products. Figure 8 shows a shape that is common to many goods.

2.3 We can now turn to the demand curve for higher education, which is analogous to the demand curve for beef. It could be expressed:

Proportion of eligible population enrolling in higher education } depends upon { private cost of higher education (including income forgone).

2.4 The eligible population is made up of those who have achieved the minimum higher-education entrance qualifications, and income forgone represents the income students would have earned had they entered employment instead of continuing their education. We can show the demand for higher education in terms of the simple demand curve *DD* shown in Figure 9.

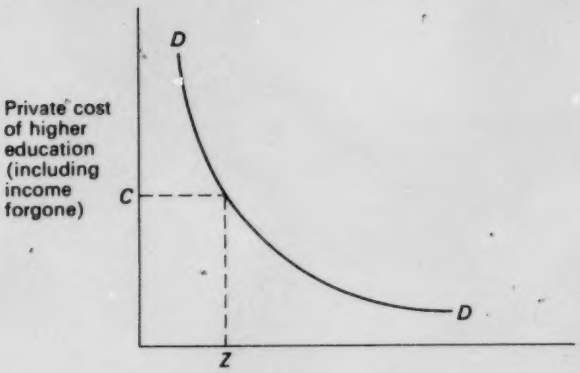

Figure 9

2.5 Figure 9 shows that at price or cost *C*, demand will be *Z*. As in the demand curve for beef, we are assuming that price is the only effective influence on demand.

2.6 We can rewrite the demand expression used above:

Proportion of eligible population enrolling in higher education } depends upon { private cost of higher education (including income forgone)

as

$$(E) = \mathrm{f}(C). \qquad [1]$$

2.7 To make life easier for ourselves, and to begin to introduce you to the conventions used by most writers in the area, from here on we shall use the letters in round brackets to stand for the factors mentioned. Unless we do this the equations can, as you will see, become very cumbersome. We shall define other factors as we go along: f means 'is a function of' or 'depends upon'; (*E*) stands for the enrolment variable

and (C) for the private cost or price to the individual of higher education. You should note that costs can be broken down in various ways that may be useful for some purposes, e.g.

C_1 = direct costs, e.g. fees, books;
C_2 = indirect costs, e.g. earnings forgone.

We can further divide C_1 to distinguish each item of direct cost separately. This may be relevant in the analysis of private demand if different costs are paid for in different ways.

Income

2.8 Although for convenience a *ceteris paribus* assumption is often made, it is clearly not true that the amount of a product bought depends only on its price. It depends also upon the income of potential consumers. The richer people are, the more beef they can buy at any given price. The same holds for higher education, and indeed all forms of post-compulsory education. Thus our revised equation might read:

Proportion of eligible population enrolling in higher education } depends upon { private cost (including income forgone) } and { income of population (especially that part of it with children over 16)

$(E) = \mathrm{f}\,(C)$, (income = I). [2]

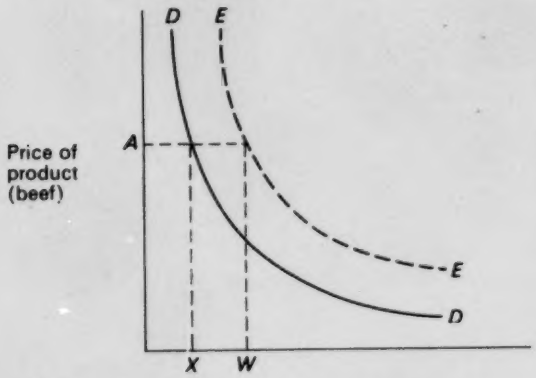

Figure 10

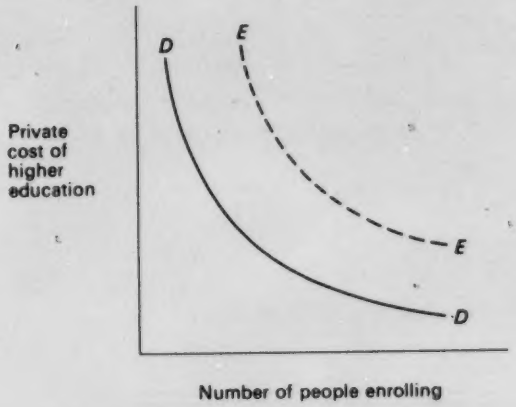

Figure 11

2.9 We can show the effect of a rise in income on the demand for a product by the dashed curves EE on Figures 10 and 11. These show that when income rises at every price more beef is bought or more people enroll in higher education. If we take the example from Figure 8, where at price A, X amount of beef was bought, at the new income level at the same price A, a larger amount, W, is purchased.

Personal preferences

2.10 Income is not the only additional factor affecting the purchase of beef or enrolment in higher education. Personal tastes and beliefs are also important. Some people do not like beef, some are vegetarians, some find that beef makes them ill, others believe that protein is not good for them and others belong to religious sects that prohibit the consumption of beef. Similarly, personal tastes and beliefs affect the demand for higher education.

2.11 So once more we must rewrite the equation:

$(E) = \mathrm{f}\,(C)$, (I), (personal tastes = P). [3]

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In this equation P should be interpreted as a combination of all those personal and social factors that affect the demand for higher education. We discuss them in detail later. We can identify each separately, thus:

P_1 = enjoyment of school;
P_2 = intensity of desire for immediate earnings;
P_3 = social class; and so on.

Personal preferences include one of the most important factors affecting the private demand for higher education, its consumption aspects. Beef is a consumption good; people buy it for the most part because they like it. So is higher education. Most students on balance enjoy their higher education and in later life many people feel they lead a fuller life, with more rewarding leisure-time activities, as a result of their education.

Education as investment

2.12 However, higher education is also an important private investment in that people with higher education earn, on average, more than those without it. Thus the demand is influenced by what are believed to be the returns on the investment. If people expect substantial rewards in later life they may be prepared to put up with high private costs to follow courses that are hard work. In countries other than Britain, people may even borrow money for such courses if their families cannot afford to keep them. Thus we have an additional factor to add to our demand function, comprising both the monetary and the non-monetary returns to higher education. We can call the sum of these returns R:

$$(E) = f(C_1, C_2), (I), (P_1, P_2, P_3 \ldots), (\text{expected returns} = R_1, R_2) \qquad [4]$$

where R_1 = monetary returns in the form of increased earnings;
R_2 = other 'returns' in later life, e.g. more job security or job satisfaction.

Trend

2.13 After allowing for all these factors there may still be an inexplicable upwards (or downwards) trend (T) in the demand for higher education. Our final demand function then may appear as follows:

$$(E) = f(C_1, C_2), (I), (P_1, P_2, P_3 \ldots), (R_1, R_2), (T). \qquad [5]$$

Activity

You should now take five minutes to write out in words what equation [5] says.

• Now you can probably see one of the reasons that people in this area prefer symbols to words for expressing the relationships between the factors. •

2.14 To make a comprehensive forecast of the private demand for higher education, we need to specify the demand function in detail and to estimate the separate and combined effects of all the various factors on the private demand. You will not perhaps be surprised to discover that no one has succeeded in doing this entirely satisfactorily, although Campbell and Siegel have gone some of the way towards it.

Reading 4 You should now read the article by Campbell and Siegel. It will take you about half an hour. The article outlines a model of the demand for higher education in the United States in the form already discussed. After you have read it you should write down which of the factors that may affect the demand for higher education were taken into account by the authors. Why were others not included in their analysis?

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3 Factors affecting the demand for higher education in the United Kingdom

3.1 You have now been introduced to the main influences on the private demand for education in the demand function. Next we will consider the various items in detail, drawing on recent research evidence and trends in the United Kingdom.

Reading 5 Before going on with the course text you should read the last twelve pages of the article by Gareth Williams (see Reading 3). He argues that economic influences could account for changes in the demand for higher education through the medium of the ratio of the private costs of higher education to the private benefits derived from it. (Read the article now. It should take you not more than twenty minutes.)

3.2 The model described by Williams views school-leavers as economic men weighing up the advantages and disadvantages of different courses of action rather as businessmen weigh up the costs and benefits of a particular investment possibility before deciding whether to go ahead with it.

3.3 Williams uses one kind of evidence. He relates an estimate of changes in the average earnings of graduates relative to the earnings of less well-educated people, to the private costs of education as measured by the difference between earnings forgone and the grant paid to students by the government. The concept of forgone earnings has been described briefly already (Paper 1). Full-time students in higher education who would otherwise have worked forgo earnings by continuing in full-time education. Table 2 sets out examples given by the Department of Education and Science in 1970.

TABLE 2

£ p. a.

	For a 15-year-old	For an undergraduate	For a postgraduate
Earnings forgone			
Gross pay	315	815	1,115
Less vacation and teaching earnings	—	60	160
Net earnings forgone	315	755	955
Public sector contribution			
(a) By loss of revenue			
National Insurance (employee's contribution)	30	45	50
Income tax of student	5	125	225
Income tax of parent	60	70	70
(b) By award			
Maintenance award, less element for books and parental contribution	—	265	435
Total	95	505	780
Balance carried by individual or his family	220	250	175

SOURCE: DES (1970) *Output Budgeting for the Department of Education and Science*, Education Planning Paper No. 1, London, HMSO, p. 28.

Self-assessment Question 1

Are there any forgone earnings or other opportunity costs for part-time adult students who work at the same time as they study?

3.4 Williams claims that the slackening of demand for higher education in the early 1970s is associated with, and can be attributed to, a reduction in the private economic benefits of higher education (at least in terms of graduate starting salaries) compared

with the private costs. This is a crude calculation; the statistics in Britain do not permit sophisticated analyses of changes over time. More refined calculations have been made for the United States by Richard Freeman in his book *The market for college-educated manpower.*[7] Freeman came to the conclusion that students' educational decisions seem to respond quite quickly to economic incentives. You will be asked to read Freeman's summary of his findings in the next paper, 'The Individual's Private Investment in Education'.

3.5 Let us examine this aspect of the private demand for education in more detail. First we will consider the economic choices confronting a young person at the end of his compulsory education. If he leaves school immediately he will have a certain range of jobs to choose from, each with associated longer-term prospects.

3.6 We should emphasize that the economic interpretation of private educational behaviour does not depend on students having precise information about the future or on the assumption that everyone who takes a particular decision will have precisely similar job options. Remember that we are considering broad averages of groups of people or, if you prefer, probabilities confronting any individual .

The age–earnings profile

3.7 On the whole people find that their earnings rise during their early years in employment, as a result of on-the-job training and experience, and then remain fairly constant for some years before the end of their working lives. An *age–earnings profile* is the shape of the relationship between age and average earnings of groups of people—for example, graduates in a particular discipline. The typical shape of these profiles and some of the possible reasons for it are discussed in the next paper in this block.

3.8 If a young person stays on at school after 16 and then goes on to higher education he will not be able to take up full-time permanent employment for at least five years after his sixteenth birthday. Thus he will have to forgo some of the earnings he might have had. In return he will have a higher average *age–earnings profile* confronting him when he emerges with his degree. The median earnings of employed male graduates and unqualified male employees in England and Wales (1966–7) are shown in Figure 12. In this measure of the average, half the population were earning more than the amount indicated, half less.

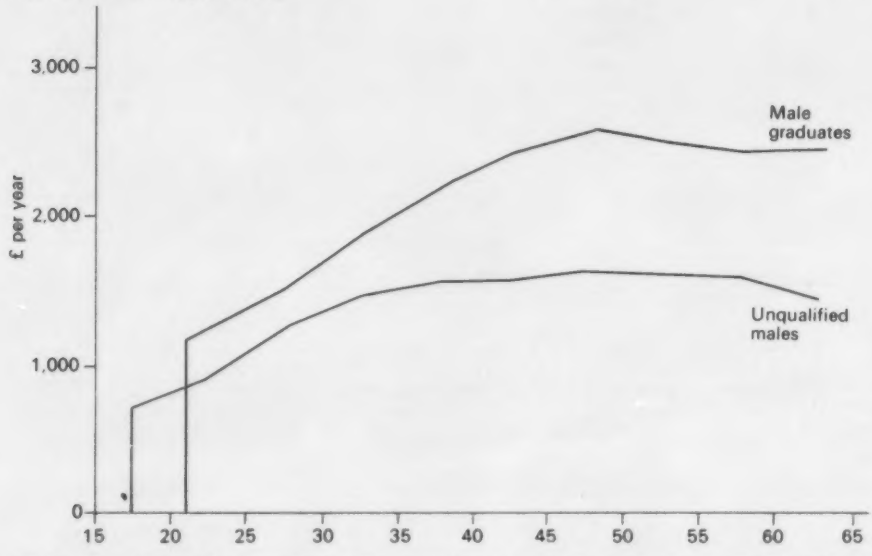

Figure 12 Age–earnings profiles: median earnings of males in employment of different ages and qualifications, 1966–7

SOURCE: *Statistics of Education, Special Series No. 3* (1971) *Survey of earnings of qualified manpower in England and Wales 1966–7*, London, HMSO.

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3.9 In a recent study by Gordon and Williams it has been shown that school-leavers have at least a hazy idea of such age–earnings profiles when they are taking critical educational decisions.[8] In this study, fifth-formers were asked to estimate average earnings in a range of occupations, some requiring additional education, some not. On the basis of their replies each was allocated to one of three categories depending on whether they had perceived a large or small earnings differential in favour of educated people. Those who perceived a large differential were very much more likely to want to stay on at school, as Table 3 shows.

TABLE 3 Perceptions of earnings differences between graduate and non-graduate occupations and intentions at the end of the fifth year of secondary school, 1975 (proportion of perceptions category with each intention by sex)

	Perceptions of graduate earnings differential					
	BOYS			GIRLS		
Intentions	Low*	Medium†	High‡	Low*	Medium†	High‡
Leave school for work	78	63	48	56	59	52
Continue in full-time education	22	37	52	44	41	48
Total numbers = 100%	133	144	155	66	108	200

* Low—perceives no or little salary differential in favour of graduate jobs (about 25% of boys and girls).
† Medium—perceives a moderate salary differential in favour of graduate jobs (about 31% of boys and girls).
‡ High—perceives a large differential (44% of boys and girls).
SOURCE: DES (July 1976) *16 and 18 year olds: attitudes to education*, Reports on Education No. 86.

Influences of economic factors on decision-making

3.10 You will be studying the formal aspects of 'rate of return' calculations, as they are called, in the next paper. For the moment our discussion will be in general terms. First of all the size of the difference between graduate and non-graduate earnings will interest the young person faced with the decision—the bigger the average difference the more likely it is to appear worth while trying to obtain a degree. If, however, the higher earnings occur late in life the difference may be less attractive than if it occurs early on. The student will also be influenced by his estimates of the probability that he himself will obtain the earnings in question. If some graduates earn very high salaries and others no more than (or even less than) a substantial proportion of earlier leavers, he may decide that he has more chance of being a highly paid non-graduate than a highly paid graduate. Children from working-class homes may feel that all the best jobs favour middle-class children anyway; some girls may feel that the job market favours men.

3.11 On the other hand, if a graduate differential is built into the salary structure—as, for example, it is in many European countries, and used to be for school-teachers in England and Wales—the risk of not securing higher earnings after graduation is reduced. The potential school-leaver will be influenced also by how well he has been doing at school. If his scholastic record so far has not been good he may feel that his chances of success are poor if he continues his education: to start training on the job or gaining work experience as soon as possible may seem more advantageous. He will also be influenced by the extent of the income he forgoes by continuing in full-time education.

3.12 Juvenile earnings that are high in relation to adult earnings may discourage some people from seeking continued full-time education. Conversely, if there is considerable juvenile unemployment, so that income forgone is low, some people may well be induced to undertake higher education who would not otherwise have done so. There is evidence that enrolment in post-compulsory education increases when juvenile unemployment is high.

For clarity of exposition our discussion has been in terms of graduates and degree qualifications. The same considerations apply, however, to decisions about undertaking any extra education or training.

Self-assessment Question 2

What factors do you think need to be considered in deciding whether the introduction of equal pay will affect the demand for higher education by women?

3.13 An article in 1973 by Adrian Ziderman examined the profitability of private investment in university education.[9] Ziderman looked at the relationship between the costs and benefits involved in studying at a university and concluded that the relationship was such that embarking on a course of higher education at university was, on average, financially worth while. His findings reinforce the view that economic considerations are likely to be important in the decision to continue full-time education beyond the secondary stage. You will be asked to read this article as you work through the next paper.

Other influences on the demand for higher education

3.14 The economic interpretation of the private demand for higher education is not the only possible one. And some people may even find it an offensive one.

3.15 Post-compulsory education has far more important functions than merely preparing people for jobs, however valuable or useful these may be. And, it may be claimed, the factors that determine whether people continue their studies are not primarily economic: they are social, psychological and educational. Considerable evidence exists, for example, that children from different social backgrounds have very different rates of staying on beyond compulsory education. There are also differences between girls and boys.

3.16 In addition, people of different levels of intellectual ability have different attitudes to the higher-education opportunities open to them; the more able, for example, may consider themselves more likely to succeed. You should note, however, that the effect of previous educational performance is not unambiguous. It is the earning potential of a given course of education that is the important concept. Some very bright people may feel that they will get what they want whether or not they have a paper qualification. Others whose previous school performance has left them less sure of themselves may feel the need for more education to bring out capabilities they feel have not been adequately developed so far. The structure of courses offered can clearly affect the demand for them: the demand for very 'academic' courses will differ from the demand for very 'practical' ones.

3.17 The demand for post-compulsory education may also be affected by broader aspects of personality. Some young people may resent the constricting atmosphere of school and want to get out of it; others may see in extra education the chance to develop their individual interests in a way that will not be open to them if they start work. Again, if we return to the influence of economic factors, young people may put a higher value on going to work immediately, even if their subsequent lifetime earnings are thereby reduced. Others, as we have noted, may be more willing to defer such material gratifications in anticipation of greater rewards.

Reading 6 You should now read paragraphs 131 to 146 in the extract from the Robbins Report, where some possible influences on the demand for higher education are discussed.

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3.18 Although the statistics in the article you have just read are by now somewhat out of date, the analysis has still not been superseded despite the enormous growth of research into higher education in the intervening period. Numerous studies have dealt with some aspects of the effect of these various factors on participation in higher education.

The influence of social class

3.19 You will have noted that the Robbins Committee examined the influence of social class on the demand for higher education. This is an area of interest that has been pursued by many commentators since the Second World War. One useful indicator that appears in the UCCA statistics each year is the occupation of fathers of entrants to university. Table 4 shows the estimated percentage of 18-year-olds from working- and middle-class families entering university from 1960–1 to 1974–5. Expansion has brought some relative increase in the probability of entering university by young people from working-class backgrounds, but the gap remains considerable. (The index is calculated by dividing home entry through UCCA by the 18-year-old group of each social-class group. Thus in 1974–5 4.4 per cent of working-class 18-year-olds entered university compared with 20.6 per cent of middle-class 18-year-olds.)

TABLE 4 University-age participation index by social class of parent, 1960–1/1974–5, boys and girls (percentages)

	'Working'	'Middle'
1960–1*	1.5	12.0
1967–8†	3.4	16.6
1970–1†	4.6	19.9
1974–5†	4.4	20.6

SOURCES:

* Robbins Report, Appendix One, Part Two, Table 1.
N.B. These figures refer to entry to degree courses of all kinds and therefore are biased somewhat upwards compared with those for later years.

† UCCA annual reports—occupational distribution of base population based on censuses; 1974–5 estimated by extrapolation.
(Working class is taken as occupation groups I–XXIII and XXVI, and middle classes XXIV and XXV.)

3.20 It is also true, as was pointed out in the Robbins Committee paper, that the social selection does not occur at the point of entry to higher education. A survey undertaken on behalf of the DES in 1975 showed that in the mid-1970s, as in the early 1960s, it was at the end of compulsory education that 'middle-class' children behaved very differently from their 'working-class' contemporaries. Table 5 summarizes the evidence.

TABLE 5 Intentions of fifth-formers by social class (percentages)

Intentions	Non-manual		Manual	
	BOYS	GIRLS	BOYS	GIRLS
Leave school for full-time employment	38	42	73	60
Continue full-time education	62	58	27	40
Total numbers = 100%	144	121	254	212

SOURCE: Gordon and Williams, op. cit. (note 9).

3.21 It is evident from Table 5 that a much lower proportion of boys and girls whose fathers were in manual occupations intended continuing in full-time education compared with the proportion from non-manual backgrounds. These research findings demonstrated that the influence of social class is paramount at the end of compulsory education, and that the differences in social-class participation at university reflect the divisions of two years previously, at the end of the fifth form.

4 Summary

4.1 In this paper we have begun to explore some interpretations of the private demand for post-compulsory, especially higher, education.

4.2 We considered in some detail the elements of an economic model and produced evidence to support it, inferred from correlations of *changes* in the demand for higher education with *changes* in the economic advantages of a degree. We also produced some evidence that careful questioning of school-leavers leads to similar conclusions. This economic model will be developed in the next part of the course.

4.3 However, we recognized too that the private demand for post-compulsory education is not determined by economic considerations alone. You have read an extract from the Robbins Report showing the importance of social background and educational factors.

4.4 The economic interpretation as a planning and policy model is not invalidated by these alternative explanations. For many policy purposes it is not important that the main reasons that some individuals go into higher education may be social, psychological or intellectual. The most important factor for policy purposes is *changes* in the private demand and it is these changes that the economic model is particularly well suited to explain. The nature of many economic phenomena is that they are in constant flux. If the economic advantages of a degree change, the change can affect the proportion of eligible young people who decide to follow degree courses, even though the majority follow their predecessors of similar social classes or intellectual abilities. It is changes *at the margin* with which economics is concerned, and which are of most relevance to policy.

4.5 A study of sixth-formers in 1968 carried out by OPCS on behalf of the Schools Council found that:

> The majority of pupils in the sample (76 per cent) had stayed on at school as a matter of course without ever considering leaving from the fifth form. However, 24 per cent had thought of leaving at the end of their fifth-form year. The reason most frequently given by *these pupils* for finally deciding to stay on at school was to obtain qualifications and improve career prospects.

These 'undecided' pupils (and we may assume that an equivalent group did decide to leave) mainly determine the fluctuations in the private demand for higher education. Policy-makers need to concentrate on them if they aim to provide new higher-education facilities to meet the private demand for places.

4.6 The authors of the 1972 White Paper *Education: a Framework for Expansion* expressed the view that:

> The Government consider higher education valuable for its contribution to the personal development of those who pursue it; at the same time they value its continued expansion as an investment in the nation's human talent in a time of rapid social change and technological development. If these economic, personal and social aims are to be realised, within the limits of available resources and competing priorities, both the purposes and the nature of higher education, in all its diversity, must be critically and realistically examined. The continuously changing relationship between higher education and subsequent employment should be reflected both in the institutions' and in individuals' choices. The Government hope that those who contemplate entering higher education—and those advising them—will the more carefully examine their motives and their requirements; and be sure that they form their judgment on a realistic assessment of its usefulness to their interests and career intentions.[10]

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4.7 In this paper we have provided a framework within which investigation of whether individuals on the whole do evaluate their post-compulsory education opportunities in the way that the White Paper wished begins to be possible. The framework can also serve as a planning tool to enable the authorities to provide higher education better in accordance with well-considered individual choice.

Answers to self-assessment questions

Self-assessment Question 1

See paragraph 3.5.

Self-assessment Question 2

See paragraph 3.13.

THE INDIVIDUAL'S PRIVATE INVESTMENT IN EDUCATION

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prepared by Adam Westoby

Objectives

At the end of your work on this paper you should be able to:

- *identify* the main private costs and benefits facing a potential student;
- *grasp* the concept of discounting;
- *define* the basic measures used by economists to combine these costs and benefits
  - net present value
  - internal rate of return;
- understand the ways in which crude patterns of private costs and earnings may, in principle, be adjusted to allow for such factors as
  - 'ability'
  - income tax
  - sex
  - not working
  - fringe and non-monetary benefits
  - uncertainty;
- assess some of the evidence on, and appreciate the complexity of, the connections between the individual's earnings, his education, and background factors such as 'ability';
- identify some of the main mechanisms through which perceived earnings may influence students' choices.

1 'Investing' in education

1.1 Essentially, this paper draws into a more exact and narrow framework factors which have up to this point been considered generally. In Paper 3 of this block ('Factors influencing the Demand for Higher Education') Gordon and Williams sketched out a 'demand function' for higher education in which they distinguished some of the main factors affecting the *aggregate* demand for places:

(C) the private costs of education;
(I) the income of potential 'consumers' or their families;
(P) their personal tastes;
(R) the expected monetary returns from more education;
(T) a possible 'trend' in the aggregate demand for education.

1.2 As Gordon and Williams point out, the problems of spelling out in detail, and then estimating statistically, a 'function' describing the aggregate demand for higher education in the population (or the relevant age-groups) as a whole, are fundamentally different from the problem of describing the situation facing an individual student or prospective student. The aggregate demand function may still be affected by a factor—such as higher expected earnings—even if some (or even most) students are not influenced by it at all; it is sufficient that some are affected by it for it to be an effective factor in the demand function.

1.3 Conversely the 'trend' that Gordon and Williams invoke as their last factor is not something that, even in principle, could enter into the decisions of individual students; it is, by definition, a catch-all for other factors that the authors of the demand function are unable to identify and estimate separately.

1.4 In this paper we concentrate on the two main economic factors that Gordon and Williams have identified: the private costs of education (C), and the expected monetary returns from education (R). Here, too, the examples are drawn mainly from higher education, although the general framework could, in principle, be applied to other levels of education.

1.5 The essential idea involved is that in embarking on higher education the individual student is making certain sacrifices (the costs) in the present and near future, in return for the expectation of higher earnings and other gains (the benefits) that will extend over virtually the whole of his or her lifetime. The decision to take a course of higher education can be seen as an investment broadly comparable to the decision by a family to purchase a house, or the decision by a manufacturing company to build a new factory. They are all, in principle, accessible to the economist's technique of 'cost–benefit analysis', a method used to appraise investments by systematically comparing the expected costs with the expected benefits.

1.6 In this paper, therefore, we take up the general idea canvassed by Gordon and Williams that higher education can be considered as a form of investment by students in their future earning power. We then set out and explain the main cost–benefit frameworks by which economists seek to bring into a single measure patterns of costs and benefits spread over a considerable period. In doing this we do not mean to imply that these factors are taken into account by all students, or that they are the only factors that have weight with students, any more than Gordon and Williams did when they incorporated private costs and returns along with other factors in their aggregate demand function for higher education. However, in the final section of this paper we set out some additional evidence on how far students are sensitive to and respond to these factors.

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Decisions by students to embark on higher education (and their decisions on which type of courses to take) have consequences not only for them as individuals but for society as a whole. Education absorbs resources and finance that could be used in other ways, thus imposing costs on the economy as a whole. It also produces more highly educated workers who, on average, earn (and arguably produce) more than they would have done without additional education. The *social* rates of return to particular levels and types of education can also therefore be investigated, taking into account the costs and benefits to the economy as a whole. The social rate of return, however, is the subject of Vera Morris's Paper 1 in Block II ('Education as a Social Investment'). In this paper we limit the discussion to private costs and benefits—i.e. those that face individual students or prospective students. However, the general framework set out, and the cost–benefit measures explained, are similar for both private and social calculations. This paper is therefore an essential preliminary to the topics dealt with in Paper 1 of Block II.

1.7 Let us start by taking the example of a student considering a first-degree-level course of higher education. (We shall also touch upon other examples. The *principles* involved apply more widely than this.) In Paper 3 by Gordon and Williams, a series of economic considerations that might affect a potential degree student's choice was mentioned, including:

(i) the 'cost' to the student of taking the course (the 'price' of education);

(ii) the average difference between graduate and non-graduate earnings over their respective working lifetimes*—described by 'age–earnings profiles';

(iii) the ways in which these differences are distributed over time—for example, whether the greatest average differential advantage to graduates arises early or late in life. These patterns, too, are visible in age–earnings profiles;

(iv) the probable earnings of the *individual* in question, which may or may not coincide with the *average* for his group, whatever course of action he adopts;

(v) the incidence of unemployment. If young non-graduates, for example, face relatively higher likelihoods of unemployment this will tend to enhance the relative attractions of university education;

(vi) the intensity with which the *individual* concerned values present advantages more than future ones, or wishes to postpone sacrifices: in the language of the social psychologist his willingness to 'defer gratification'; or, to use the analogous terminology of the economist, the extent to which he *discounts* the future relative to the present.

These sorts of factors, and other similar ones, are all brought together by economists by the techniques of cost–benefit analysis. The approach has the general object of combining into a single measure or indicator all the costs and benefits that are expected to arise from a particular decision.

1.8 There is nothing unique or *sui generis* about the specific applications we shall be discussing in this paper of cost–benefit analysis to *educational* decisions. The same basic principles could be applied to decisions on buying a car, or a house, or on savings or life-insurance schemes. Cost–benefit analysis is nothing more than a formal framework developed by economists for weighing the 'pros' against the 'cons' of decisions.

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* Or even, on some views, beyond the lifetime of the individual taking the decision, since the level of education he or she attains will affect the educational and other opportunities open to his or her children, and parents may well attach a value to advantages that fall to the children.

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1.9 We must also bear in mind that the 'pros' and 'cons' of a decision are never certainly or exactly known, but perceived with considerable uncertainty and haziness. This, too, is something we shall return to later in the course. The uncertainty applies, quite clearly, to the decisions of individuals (who can foretell exactly next year's mortgage rates, or the future price of petrol?), to the decisions of firms (will next year bring cheaper and more efficient computers?) and to those of public authorities.

Self-assessment Question 1

We listed above some of the costs and benefits that might affect the decision of a potential student contemplating a degree course. Please list below the costs and benefits that might influence the decision of a family man whether or not to buy a car. (Where you cannot easily disentangle 'costs' from 'benefits', nevertheless note down the relevant factors. It may help to imagine to yourself a dialogue with a car salesman!) We have listed at the end of this paper some of the main costs and benefits that occur to us.

You should spend only a few minutes on this question.

1.10 Let us for a moment visualize the situation of a young man in 1966 (we shall come to women, who in certain respects present more complex problems, a little later). He is English, aged 18, has just obtained three A levels at school and is in the happy position of being able to choose among a number of courses of higher education. Alternatively he may opt not to take any of them, but to start full-time work immediately and continue in it until retirement. As a first approximation, we may represent the choices facing him by age–earnings profiles, following the general lines of those used in the preceding paper.*

1.11 To begin with we assume he is concerned only with the monetary costs and benefits. To combine simplicity with some realism we use figures based (with some necessary approximations) on those in the DES *Survey of Earnings* of 1967; the essential approximations involved are explained below.†

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* For discussion of age–earnings profiles in general see Blaug (set book) pp. 22–9, and Ziderman (note 9). In general age-earnings profiles based on cross-sectional information (from observing the earnings of people of *different* ages at the *same* point in time) have some common features: they rise during the early part of working life to a peak, often in early middle age, then decline, more gradually, to retirement. The problems of comparing earnings by cross-section age–earnings profiles are discussed in paragraph 4.21. It is interesting to note that some of the first work carried out by Soviet economic planners on the contribution of education to the skill and productivity of workers laid stress on the fact that over a wide range of occupations (including skilled manual workers and chess grand-masters) there was evidence that skill was at its highest around 30–35. See Strumilin, S. G. (1925) 'The economic significance of national education' in Robinson, E. A. G. and Vaisey, J. E. (eds) (1966) *The economics of education*, London, Macmillan, pp. 276 ff.

† These relate to the period 1966–7, and are mainly based on the Department of Education and Science (1971) *Survey of Earnings of Qualified Manpower in England and Wales 1966–7*, London, HMSO (hereafter 'DES *Survey of Earnings, 1966–7*'). Since then, unfortunately, no more recent *comprehensive* information has been available, and in much of this paper we shall therefore use this source, together with some supplementary information relating to the same time. However, although the *absolute size* of monetary earnings at all ages and levels of qualification has greatly increased since then—mainly as a result of inflation—the general shapes of age–earnings profiles will probably have altered much less.

TABLE 6 UK male earnings by age and education, 1966–7 (£s/year)

Age	Equivalent of A levels (*A*)	All first degrees (*G*)	Science first degrees (*S*)	Social science first degrees (*SS*)
18–20	800*	(340)†	(340)†	(340)†
21–24	1,100*	1,415*	1,320*	1,475*
25–29	1,340	1,570	1,450	1,700
30–34	1,570	1,990	1,940	2,200
35–39	1,760	2,330	2,200	2,540
40–44	1,890	2,710	2,760	3,180
45–49	1,920	2,850	2,720	3,080
50–54	2,020	2,760	2,860	2,950
55–59	2,090	2,950	2,800	3,320
60 and over	1,680	2,540	2,310	2,920

* Approximations for the age range.

† Maximum LEA grant, rather than earnings.

SOURCE: DES, *Survey of Earnings, 1966–7.*

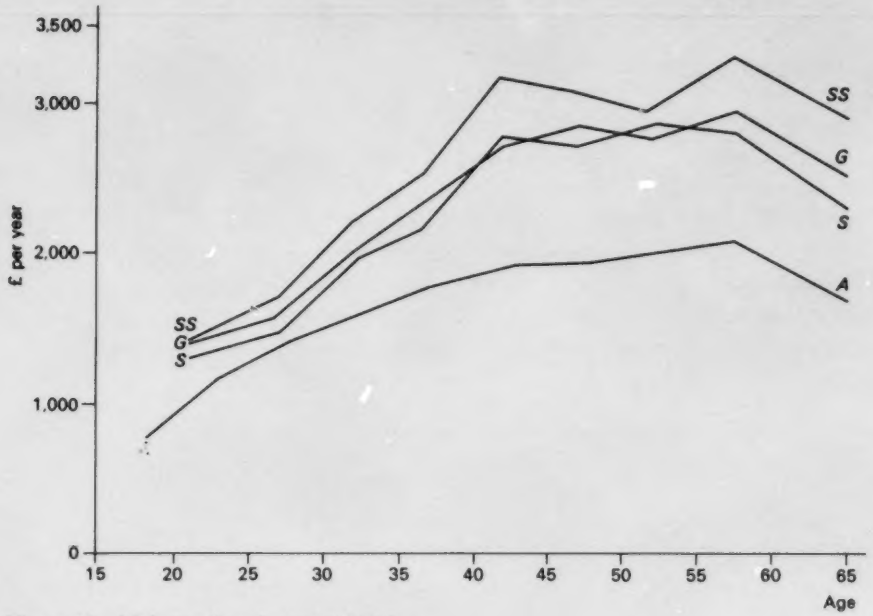

Figure 13 Male earnings by age, 1966–7

1.12 We look first at the student's major choice, which we may simplify as follows: whether to take a degree course, then take a job as a graduate, or to enter the labour market immediately. The average earnings of all male graduates and equivalents (level 'b')* from age 21 to 65 (taken as the usual age of retirement) are shown as line *G* in Figure 13. We do not have exactly comparable figures for the 1966–7 earnings of men whose highest qualification was three A levels. We therefore use, as an approximation, the earnings of those with a variety of diplomas and certificates (level 'c') lower than a degree: that is, the next educational level below a first degree or equivalent identified in the DES *Survey of Earnings, 1966–7.*

These earnings, for ages 18 to 65, are shown in Figure 13 as line *A*. Table 6 gives these earnings in the broad age-ranges used by the survey (i.e. not interpolated year by year).† In 1966, from the point of entering work after graduation right up to retirement, the new graduate could expect on average to get higher earnings than he would have had as a non-graduate. Over this period, it is all benefits, as far as purely

* For a description of the educational levels used (levels 'b' and 'c') see DES *Survey of Earnings*, Appendix 2, p. 40. It is probable that the reported earnings at level 'c' slightly overestimate the number of people with A levels only.

† Particularly for the lower ages, we have had to estimate earnings at ages for which we only have averages within an age-range.

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monetary results are concerned. As a first approximation, we may estimate the benefits at each age as the difference between the average earnings he could expect as a graduate and as a non-graduate. This difference is represented by the space between the lines *G* and *A* in Figure 13 over the age range 21–64.

1.13 But what of the three years of the student's degree course, from, let us say, 18 to 21? It is in this period that his costs are incurred. Again we must draw a broad and approximate picture. If he opted for a degree course he would forgo earnings (which we have estimated at £800 a year) during his period of full-time study. (These 'opportunity costs' would be the same whatever degree course he opted for.) But against this he could (we suppose) set the fact that he would have had a Local Education Authority maintenance grant, in 1966–7, of £340 a year.* The decision on his part to take a degree course would therefore involve monetary costs of (let us say) £460 a year (£800 forgone earnings, minus £340 LEA grant) for the first three years, followed by monetary benefits during the whole of his working life after age 21. We represent this pattern of costs and benefits in Figure 14, in which costs are displayed simply as negative 'benefits'.

1.14 It will be clear that to arrive at this point we have had to make all sorts of simplifications, and that we have omitted numerous factors that real students would very probably take into account. We have left out the possibilities of the student taking a job during the vacation, and the (more recently exploited) possibility of his claiming supplementary benefit during vacations, both of which would reduce the probable cost of higher education to him. Nor have we taken account of certain other costs that being a student necessarily imposes, such as the need to buy books and other materials, or (frequently) to pay for lodging away from home. We have made no allowance either for monetary concessions to students, such as cheap travel and cheap theatre tickets. These are, however, secondary to the main monetary costs.

We have left aside the question of whether the student could reasonably expect the *average* earnings we have mentioned, or whether his abilities would place him above or below the average; nor have we discussed the effects of tax on the earnings he would actually retain. And we have, so far, left out of account all costs and benefits other than monetary ones. We shall return to some of these issues later in the paper, showing how some of these factors can, in principle, be incorporated within the measures of cost–benefit analysis. But in this section we use the very simplified pattern of costs and benefits we have constructed to explain the different ways in which cost–benefit analysis tries to provide a formal, consistent framework for choice.

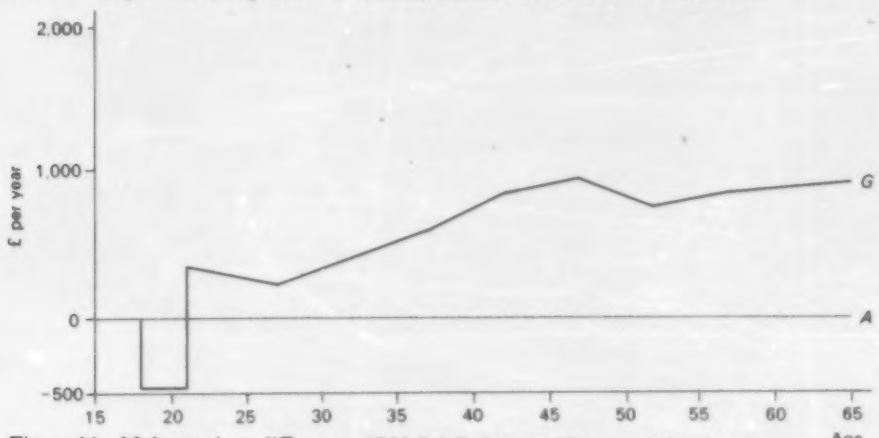

Figure 14 Male earnings differences 1966–7 (all degrees (*G*) over A levels (*A*))

* This—the maximum grant at the time—assumes that his parents were poor enough not to be required to contribute to his support at university. This would not be the typical case, the majority of students being from relatively more affluent homes. The *average* maintenance grant at that time was £260 per annum.

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1.15 Let us suppose that our prospective student has definitely decided to apply for a degree course. One factor in his decision is likely to have been his perception—probably rather vague—of the costs and benefits we have been discussing. But it is not possible to simply decide on 'a degree course' in the abstract; one must generally apply to study a specific subject (and certainly to a specific institution). How do these factors bear upon such decisions?

Self-assessment Question 2

Look back to Figure 13 and Table 6. They show not only the average earnings for male graduates in *all* subjects, but also those for scientists (line *S* on the figure) and for social scientists (line *SS*). If our prospective student is hovering between (say) a chemistry and an economics degree, how do you think this sort of information might influence his choice, and why? Spend not more than five minutes noting down an answer; our brief comments follow immediately below.

1.16 It seems obvious that the main effect of the sort of picture of relative earnings in Figure 13 would be to influence the student towards the social sciences (the economics degree) at the expense of the natural sciences(the chemistry degree).* From the point of view of private costs† during the three years of study, there is no difference between the two subjects (this goes for the large majority of three-year degree courses). But as a social scientist he would (*a*) earn more on aggregate over his working life as a whole; (*b*) earn more *at each point in time*. That is to say, there is no period in which he could expect to be (monetarily) better off as a chemist than as an economist. (Perhaps the relatively high earnings of social scientists help to explain the strong pressure for social science places in universities during the 1960s.) In this case the analysis of the monetary factors bearing on choice is fairly straightforward. This simplified way of presenting the matter, however, does not take account of the fact that the student may believe, with good reason, that his own abilities lie much more strongly in one direction than in others. If, say, he believes that he would be an excellent chemist but an indifferent economist, he might well prefer chemistry to economics on financial grounds alone—believing that as a chemist he would earn more than the average, and as an economist less.

1.17 But we can easily visualize profiles of earnings where the relationship is not so simple. For example, what of a pattern of average earnings (from another degree subject) where the *total* of additional earnings (over one's expectations with A levels alone) was less than that for a social science degree, but which gave *higher* earnings early in life, and lower ones later on? (Such a profile—exaggerated to make the point—is shown in Figure 15 (as line *X*).

Self-assessment Question 3

How might our prospective student respond to this sort of choice? Spend a few minutes noting down the factors that might determine his choice. (You may find it helpful to refer to paragraph 1.7; our comments follow below.)

1.18 It seems evident that the key factor will be the 'strength' with which the student prefers benefits in the immediate future to those in the more distant future: to use the terminology mentioned earlier, the extent to which he 'discounts' the future. A student

* We are not suggesting that this influence will be decisive. Many, if not most, students have an interest in the subject-matter of their courses—and the occupations to which they expect them to lead—independently of the extra earnings they expect to crown their efforts!
† I.e. the costs faced by the 'private individual', in this case the student.

who acts on the basis of a zero, or very low, rate of discount will still prefer the social science degree, since it offers greater benefits over the whole of his working life. But one with a high rate of discount will tend towards the imaginary course (*X*), since its

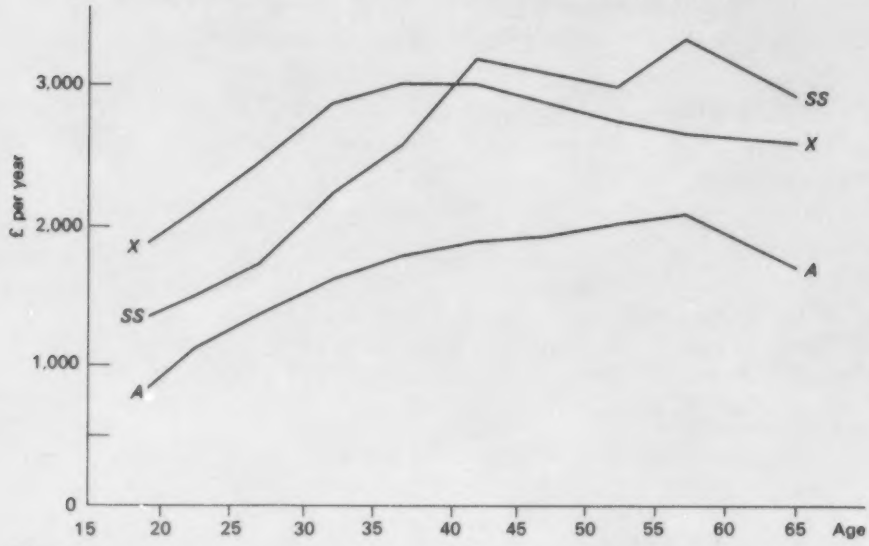

Figure 15

'returns', while smaller, are considerably more rapid. In general all students (in fact all people making economic choices) will prefer the present to the future to *some* extent; they will all have a *positive subjective rate of discount*. In the next section we spell out the more formal frameworks within which cost–benefit analysis uses the idea of discounting to produce the various measures for choosing among options.

2 A single measure?

2.1 Within the stylized framework we are adopting, the student's choice among the private costs and benefits associated with alternative courses of higher education now resolves itself into the problem of finding a criterion for choice between the patterns of *net* costs and benefits as they are distributed in time.

2.2 It is clear that, as between two net benefits available *at the same point in time*, the student would (if he were behaving rationally) always choose the larger. It is equally clear that he would have no difficulty in choosing between benefits *of the same size*, arising at different points in time. He would always choose the earlier, since he could, if he wished, save it until later anyway, investing it to produce more at a later date. In choosing the earlier ones he is, in effect, discounting the future ones.

2.3 Note that it is essential to distinguish 'discounting' from the effects of *inflation*: the fact that, as a result of general increases in money prices and wages, £1 is likely to buy less in the future than in the present. It is perhaps easiest to grasp the distinction by imagining a world without inflation—one in which the money prices of all goods and services, and the wages of people of given qualifications and ages, remained constant through time. Under these circumstances earlier benefits would still be preferred to later ones of the same size.

2.4 The central difficulty comes in choosing among patterns of costs and benefits that differ *both* in their sizes *and* in their distribution in time. One method is to *adopt* a

rate of discount and use it to convert the net benefit or cost at each point in time to an equivalent at the starting date, the 'present'. (Costs and benefits that are already past, being unalterable and therefore not the subject of choice, are irrelevant.) All future costs and benefits are thus converted to their present equivalent values,* and the options facing the student can then be evaluated by comparing the difference between overall benefits and costs (net discounted benefits), or the ratio of benefits to costs for each option.

2.5 The rate of discounting *adopted* is clearly crucial. The higher the rate, the more heavily will earlier costs and benefits weigh relative to later ones. Large differences of earnings at age 40 or so may not be enough, if the student favours a high discount rate, to outweigh relatively small additional costs in the immediate future.

2.6 Implicit in this procedure is the question: what does the rate of discount express? At this stage we suppose merely that it represents the relative 'impatience' of the individual student (later in the course it will acquire a more general significance). Thus students who very strongly prefer present to future gratification will tend to compare options using a high discount rate, whereas those who are content to reject a short life and a merry one in favour of a placid longevity will tend to use a low one.

2.7 For each of the cost and benefit streams that we visualize as facing our hypothetical student, the difference between discounted costs and benefits gets *smaller*, the *larger* the discount rate. This common feature exists because each of the courses presents (in comparison with the option of no higher education) a profile of costs (negative benefits) in the immediate future, followed by positive benefits later on. The impact of increasing the discount rate is stronger on the benefits that are further in the future. This is true of most forms of investment.

2.8 Moreover, for each of the profiles considered there is *one and only one* rate of discount that makes the net discounted benefits (the *difference* between the total discounted benefits and the total discounted costs) equal to zero (or, what is the same thing, the *ratio* of discounted benefits to costs equal to 1). This rate, called the *internal rate of return*, provides an alternative measure combining the costs and benefits that arise under each option. It is the rate of discount at which each option breaks even. As a measure of the desirability of the option the internal rate of return has the advantage that (unlike the ratio or difference of discounted costs and benefits) it does not require the *choice* of a discount rate; it *is* a discount rate—one implied by the pattern of costs and benefits.

In practice, internal rates of return are most conveniently calculated by using a computer programme. The formal conditions which define the internal rate of return implied by a given pattern of costs and benefits over time are also set out in the Woodhall and Blaug references that follow.

2.9 As a first approximation we may say that internal rates of return express the 'rapidity' with which early costs return later benefits for each option, leaving out (as does the cost–benefit ratio) the absolute size of the costs and benefits.

Reading 7 At this point you should read the following sections from Maureen Woodhall's *The use of cost–benefit analysis in educational planning:*

'Measurement of a discounted cash flow'
'Rates of return on investment in education'

You may also wish to refer to the section in Blaug (set book) 'How to calculate rates of return', pp. 54–60. These readings should together take you about half an hour.

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* Expressed formally, the present value (P) of applying an annual rate of discount (r) to a benefit B expected to accrue t years hence, is given by: $P = \frac{B_t}{(1+r)^t}$.

Measurement of a discounted cash flow

Age–earnings profiles give an estimate of the annual earnings differentials associated with education. A cost–benefit calculation requires these earnings differentials to be combined into a single figure, representing the total monetary benefit to be derived from education, so that this can be compared with its cost. The simplest method would appear to be to add together each year's additional earning power, but this would make no economic sense. For the costs of an investment must be incurred in the present in order to obtain income in the future, and the expectation of receiving money in the future is worth less, in the present, than a corresponding amount actually received in the present. This is not simply a case of 'a bird in the hand is worth two in the bush', but reflects the fact that a sum of money received today can be invested at a positive rate of interest, so that it will increase steadily and in time be worth very much more than its present value. The rate of increase depends, of course, upon the rate of interest at which it is invested; a sum invested at 10 per cent will double itself in just over seven years, whereas the same sum invested at 5 per cent will double itself in about fifteen years. Therefore, if funds can be invested at 10 per cent, the promise of a dollar in seven years' time is worth only half as much as a dollar today, and the promised sum must, therefore, be discounted. Just as the increase depends upon the rate of interest at which money is invested, so does the present value of a sum of money to be received in the future. The higher the rate of interest, or discount, the lower is the present value of money expected at a future date: and similarly the further ahead the promised date, the lower the present value. This is illustrated in table 2, which shows how quickly $1 will grow if invested at 10 per cent compound interest, and also the present value of $1 expected in the future, if the discount rate is 10 per cent.

TABLE 2 Compound growth and present values at 10 per cent rate of interest

Year	Amount to which $1 invested will grow at end of each year	Amount which $1 promised at end of each year is worth today
1	1.100	0.909
2	1.210	0.826
3	1.331	0.751
4	1.464	0.683
5	1.611	0.621
6	1.772	0.564
7	1.949	0.513
8	2.144	0.466
Etc.		

Table 2 can be generalized, as follows.

1. A sum of money (A), invested at a positive rate of compound interest (r) for n years, will grow to $A(1+r)^n$ by the end of the period. Thus, $1 invested for four years at 10 per cent grows to $\$1\ (1+0.10)^4 = 1.464$.
2. The present value of a sum of money (A), expected at the end of n years, when the discount rate is r, is $A/(1+r)^n$. Thus, $1 expected at the end of four years, at a discount rate of 10 per cent, is now worth $\$1/(1+0.10)^4 = 0.683$.

All cost–benefit calculations involve the discounting of future flows of income, since the purpose of the calculation is to compare the present value of expected future benefits with the costs of the investment, which must be incurred in the present. If the costs of the project are spread over a period of years these must also be discounted so that all money values, whether negative (costs) or positive (benefits) are expressed in terms of their present value. The technique of measuring future streams of income in terms of its present value is called the 'discounted cash flow' technique, and is a common feature of all kinds of investment appraisal. The technique is extremely simple, and involves no more than the calculation of the present value, at some given or assumed rate of interest, of the income expected in every future year; the present value of the entire lifetime income stream is then given by the expression

$$\sum_{t=1}^{n} \frac{E_t}{(1+r)^t}$$

where n is the life of the investment project, E is the expected income from the investment, r is the rate of interest and $\sum$ denotes the sum of annual benefits from year 1 to year n. The calculation of discounted present value is an extremely simple process, because of the availability of tables showing the value of $(1+r)^t$ (compound interest) and $\frac{1}{(1+r)^t}$ (discount) for any value of r and t.

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Rate of return on investment in education

Once the costs and expected benefits of an investment project have been measured, and have been discounted at an appropriate rate of interest, the essential elements of a cost–benefit analysis are available. All that is now needed is a simple means of summarizing the information so that the costs and benefits of alternative investments can be compared. There are three basic ways of presenting this information in a convenient form, firstly by means of a benefit-cost ratio, secondly by a calculation of the present net value of the project, and thirdly by calculating the internal rate of return of the investment. A benefit–cost ratio, as the name implies, simply measures the ratio of discounted future benefits to discounted costs, at a particular rate of interest, and the present net value of a project is the value of discounted benefits minus discounted costs. Both these measures of investment yield have been used to carry out cost–benefit analysis of education, but they are less frequently used to evaluate education than the third technique, rate-of-return analysis. The rate of return of any investment project is simply the rate of interest that equates the discounted present value of expected benefits and the present value of the costs of the project. In terms of the symbols used in the previous section, the rate of return is the rate of interest at which the present value of expected benefits, $\sum_{t=1}^{n} \frac{E_t}{(1+r)^t}$ and the present value of costs, $\sum_{t=1}^{n} \frac{C_t}{(1+r)^t}$, are equal, or in other words the rate of interest at which the difference between discounted benefits and costs is zero. That is, $\sum_{t=1}^{n} \frac{E_t+C_t}{(1+r)^t} = 0$

All three forms of cost–benefit analysis share the basic characteristics of measurement and discounting of costs and benefits, and the presentation of this information in a single summary statistic. The main difference between them is that benefit–cost ratios and present net value calculations depend upon an assumed rate of interest, whereas the rate of return on an investment is independent of any assumptions about interest rates, and simply shows the rate of interest that equates costs and benefits. If a private firm wishes to assess the yield of an investment, it is a simple matter to use the firm's own borrowing rate as the discount rate for cost–benefit calculations; the most profitable investment is then the project which has the highest benefit–cost ratio, or present net value, at the rate of interest which the firm must pay to obtain credit. Unfortunately, when we come to assess the yield of investment in education it is less obvious what rate of interest is appropriate. The relevant concept to compare with the yield of investment in education is the average alternative yield on public or private investment. Is this 10 per cent or 20 per cent? This remains a matter of controversy, and the answer is likely to be different in different countries, and at different times.

The virtue of using the rate of return as a means of measuring the yield of educational investment is that the choice of an alternative rate of return is not built into the calculation as it is in the case of benefit–cost ratios. It is possible to draw some conclusions from a cost–benefit analysis which shows that the social rate of return to university education is 8 per cent, whereas the rate of return to primary schooling is 15 per cent, even if there is still uncertainty about the rate of return to alternative forms of social investment. For this reason, most examples of cost–benefit analysis of education use the rate of return, and this booklet will concentrate on this particular type of cost–benefit analysis.*

To sum up the arguments of the previous sections: cost–benefit analysis of education consists usually of an attempt to measure the social or the private rate of return to investment in particular types or levels of education. The social rate of return measures the relationship between the before-tax lifetime earnings differential

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* This section presents an extremely simplified version of the arguments for rate-of-return versus alternative forms of investment appraisal. A more detailed explanation of this point is given in M. Blaug, R. Layard, M. Woodhall, *The Causes of Graduate Unemployment in India*, London, Allen Lane, The Penguin Press, 1969, pp. 25–28.

associated with a particular type of education, and the total social cost of that education measured in terms of its opportunity cost. This rate of return can be compared with the rate of return on other types of levels of education, or with alternative forms of social investment, to provide a measure of the economic profitability of educational expenditure by the state. Similarly, the private rate of return, which measures the relationship between after-tax earnings differentials and those costs that are borne by the individual, provides a means of assessing education as a form of private investment, such as the purchase of equity shares.
This bald summary will undoubtedly raise many questions in readers' minds about the validity of such a measure of the benefits of education, the extent to which earnings differentials really are the result of education, and finally whether governments or individuals really do, or should, make educational decisions on the strength of assessments of economic profitability.

2.10 As she points out, Woodhall raises further questions about which (if any) of the alternative cost–benefit measures might be appropriate instruments for choice in particular situations. The following section will return to these. But, as far as private costs and benefits are concerned, we must begin to broaden our range of examples slightly.

3 The student's situation

3.1 So far we have been discussing alternative types of courses facing a particular student in a given situation. But, in reality, there are many features of the student's own situation that may be expected to affect the value he or she puts on a particular course and thereby exert an influence upon his or her choice among courses available. In this section—without going into factual details, but using the general framework we have developed—we consider some of these features.

3.2 One major factor is the sex of the student. This has several effects.

(i) Women earn, on average, less than men with equivalent qualifications. This affects (*a*) the earnings they forgo during higher education, and (*b*) the additional earnings they may expect after graduation. To get a general idea of the extent of these differences you may look at Charts 1 and 2 of the article by Adrian Ziderman (see note 9). The whole of Ziderman's article is required reading later in this paper. This shows the age–earnings profiles in 1966–7 for men and women with equivalent qualifications. Women earn, at all points, less than men. One effect of these lower earnings is, in general, also to depress the earnings *differences* associated with extra education for women below those for men. The adoption and enforcement of equal pay and anti-discrimination policies by governments (and trade unions, professional associations, and so on) will reduce differentials between men and women in similar jobs and thereby, to a certain extent, reduce the differentials between similarly educated men and women.

(ii) In addition women are much more likely than men to withdraw from the labour force as a result of marriage and parenthood, and when they return to work they are unlikely to make up immediately (if ever) the ground they have lost. One reason this is likely to be so is that the increase in earnings during working life almost certainly takes place partly as a result of on-the-job training and accumulating experience. A break in working life therefore not only affects earnings at the time but interrupts a *continuing* process of (largely informal) education.

3.3 Please now make brief notes on what the impact of these factors will be on the cost–benefit measures that might influence a woman student's decision whether or not to undertake higher education. Our comments follow immediately below.

3.4 (i) Lower earnings forgone during education will reduce a woman's private net costs in the near future, relative to those a man would face. At *any* discount rate, therefore, her *net discounted benefits* will be higher as a result of this factor. Similarly the implied internal rate of return will be higher.

(ii) But lower *additional* earnings expected after graduation will work in the opposite direction. At any rate of discount the net discounted benefits will be lower. And, equally, the internal rate of return will be lower.

(iii) Similarly, her absence from the labour market will also reduce the net discounted benefits (and the internal rate of return). Notice that *any* change—such as a 'gap' in earning life caused by child-rearing—that has the sole effect of reducing the net discounted benefits at any discount rate also reduces the implied internal rate of return.

Self-assessment Question 4

Please refer to Charts 1 and 2 of Ziderman's article and make brief notes analysing how the expected timing of a woman's absence from the labour force for child-rearing might affect her decision on taking a first degree. Our comments follow immediately below.

3.5 It is useful, in our view, to distinguish conceptually three effects.

(i) The later a *given* reduction in benefits occurs, the less will be its impact on the expected net present value, or private internal rate of return, to the course. With *any* positive rate of discounting the more distant future will weigh less heavily than the nearer future.

(ii) But the later an interruption in working life takes place the larger will be the *differential* earnings of which it will deprive the woman graduate. This may or may not offset the effects of discounting.

(iii) The timing of such an interruption will also affect its impact on on-the-job training and experience at work and thereby, probably, on future earnings. The earlier it is, the longer—by definition—these effects may be expected to last, but it is not easy to say how the magnitude of the effect will be affected by its timing. Since these effects counteract one another it is not easy to say what the net effect will be. The specific problems of the returns to women's education are also discussed in Paper 1 of Block II, 'Education as a Social Investment'.*

3.6 Cost–benefit analysis can also incorporate other changes (less radical than an alteration of sex) in the situation of the student.

Self-assessment Question 5

What, for example, would be the results of an increase in the student grant (from, say, £340 to £500) in the latter two years of undergraduate study? You may visualize, referring to Figure 14, how this would affect the situation of our male student taking a degree.

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* If you are interested in this subject you may also wish to read, now or later, Maureen Woodhall's article 'The economic returns to investment in womens' education'. This should take you about half an hour. It is, however, suggested and not required reading for this course.

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3.7 Another important variation will be relevant to overseas students. They are now usually obliged both to pay high tuition fees,* and to pay the full cost of their maintenance while at university in this country. Both factors will clearly reduce the net discounted benefits of courses to overseas students. However, the relevant alternative earnings streams may be different from those facing UK students—if, for example, they do not have the option of working in the UK at UK wage-rates, rather than undertaking higher education, or of remaining to work in the UK after they graduate.

Self-assessment Question 6

Please now make brief notes on the following questions:

How would the possibility of vacation work affect the choice of the individual student? What would be the impact of higher levels of unemployment among young non-graduates?

These notes should take you not more than five minutes; our comments are given at the end of this paper.

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4 The reality of individual students' choices

4.1 Up to this point in our discussion we have been varying some of the characteristics of the higher-education courses among which our hypothetical student is choosing, and some of the characteristics of the student himself. But we have been assuming that the individual student, in considering a given course, is in a position to choose between courses of action that offer alternatives between *average gross* earnings and to choose between them with certainty. In this section we draw attention to some of the main qualifications that make these assumptions unrealistic, and in need of modification.

Income tax

4.2 From the point of view of the private individual, the real disposable income streams among which he is concerned to choose are those that he receives after tax, not before. Consequently, the alternative earnings among which our (hypothetical) student should have been choosing were those after deduction of income tax, not before. For those paying the standard rate of income tax on earned income in the UK, this represents a deduction from additional taxable income of around one-third. Since, in the age–earnings streams that we have discussed up to this point, both the upper and lower alternatives from the date of graduation onwards fall within the range of standard income tax, the difference of earnings on which calculations of the private returns should be based should be reduced by about one-third.†

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* High, that is, relative to British students for whom tuition fees (which in any case cover only part of the cost of tuition to the university) are in general paid directly by the LEA to the university.

† Each earning stream taken *individually* will be reduced by rather less than this, since a first part of the earnings of individuals is exempt from tax. The extent of this part may be increased by allowances for dependants and so on. And the lower earnings stream will be reduced by proportionately less than the upper one, since the tax-free portion of income forms a higher fraction of it. But this will not affect the reduction of the difference, where both levels of earnings lie within the range of standard income tax.

4.3 However, as far as forgone earnings and other costs prior to the date of graduation go, the situation is somewhat different. Forgone earnings themselves should be considered net of tax, that is to say reduced—because of tax-free allowances—by something under the rate of standard income tax. But the maintenance grant to students, which is subtracted from forgone earnings to give total private costs, is free of income tax and is therefore subtracted *in toto*. The overall effects of income tax, therefore, are to reduce both the private benefits and the private costs in the typical patterns of private costs and earnings that we have been considering. Since the effects act in opposite directions they will not necessarily have an unambiguous effect on the private rate of return from higher education.

Does extra education give rise to extra earnings?

4.4 In comparing average streams of income we have implicitly assumed that the *whole* of the difference between average earnings is due to additional education. A moment's reflection will show that this is not necessarily the case. A number of characteristics of an individual—belonging to a higher socio-economic class, having greater than average intelligence and ability, or possessing stronger than average ambition and drive—may well lead him or her *both* to progress further than others of his or her generation up the educational ladder, *and* to have higher earnings at whatever level of education he or she finishes.

4.5 You will also be studying, in Paper 1 of Block II, where Vera Morris deals with social rates of return, the empirical evidence on what proportion of income differences should be attributed to additional education at various levels. But the general point to be made is that some important characteristics of individuals can be regarded as causes of, or at least factors tending to produce, *both* higher educational qualifications and higher earnings. In so far as the individual has these characteristics (such as higher than average intelligence) the observed differences between average earnings will tend to overstate the gain that he may expect from additional education. To visualize, in very simple terms, the situation of our hypothetical student: if he had the average intelligence of students admitted to the course he was considering, his intelligence (assuming that the education system tends to select into its higher levels those with relatively higher intelligence) would be higher than the average of those without degrees. In so far as intelligence affects the earnings of the individual, he could therefore expect, if he opted *not* to undertake higher education, to earn above the average in this group of people, and the expected difference in earnings would be correspondingly reduced. Intelligence and other factors will also have an effect on earnings forgone before graduation.

'Filtering'

4.6 Another way of looking at the association of higher levels of education with higher earnings is what has come to be called the 'filtering hypothesis'. This argues, in part, that it is quite possible that the earning capacity of individual workers is something inherent in the individuals—corresponding, perhaps, to some measure of their innate 'ability' or intelligence. It might therefore well be that the function of many areas of the education system is not to increase the earning capacity of those who pass through them, but rather to act as a 'filter', tending to select as educationally successful those whose potential earnings happen also to be higher.[11]

4.7 The implications of such a view are fundamental for calculations of the social returns to education, but less directly so for the private ones. Let us take an extreme example. Suppose that university education in the arts and social sciences in itself does nothing

to improve the earnings of its graduates. It merely acts as a series of filters—through processes of university admission, examination and dropping-out during the course, the granting and withholding of degrees and the ranking of these degrees according to academic merit—in such a way as to produce as an end-result a population of graduates considerably richer in members who are more 'able' and have higher earning capacities than was the larger population of applicants formally qualified by A-level results to enter university. Employers are then prepared to pay more to *all* such graduates, since they regard higher education as a reliable selection mechanism. This interpretation does not affect the desirability of university education *from the point of view of the private individual.* Employers will still regard the possession of a degree, or, more specifically, a certain type and class of degree, as a necessary or very desirable condition of appointment to well-paid occupations and careers.

4.8 The hypothesis that it is partly the 'filtering' or certification aspect of education, rather than its content, that 'produces' higher earnings among the educated is complementary to the idea that education causes only part, and not the whole, of increased productivity. This second view leads to an approach (considered also in the following reading) that seeks to assess statistically the contribution of education to earnings of individuals by making allowance for all those factors *other* than education that collectively affect real earnings. The effect of education is then gauged, after a process of elimination, as a 'residual'.

Reading 8 These problems, and some of the problems of statistical measurement associated with them, are brought together in two passages from Blaug (set book) which you are now recommended to read. These are (i) the section 'How much is due to education', pp. 32–46, and (ii) the passage starting 'We come back now to the question . . .', pp. 51–4. They should take you about three-quarters of an hour.

4.9 Empirically Blaug concludes that, as an approximation, it is fairly generally true that about three-fifths (0.6) of earnings differences are attributable to difference in educational level—this proportion being referred to as 'the alpha-coefficient'.* Since Blaug wrote, evidence has mounted that a better estimate may be somewhat higher—perhaps almost four-fifths.† This would imply that only about one-fifth should be independently attributed to factors other than education (including 'ability' in its various guises.) Clearly the reasons are more important than the exact result. Our comments follow.

Self-assessment Question 7

Please make brief notes in answer to the following questions. How will a private internal rate of return derived from gross average-earnings data be affected by:

(i) income tax;

(ii) the fact that education accounts for only a *part* of earnings differences;

(iii) the combination of these factors?

4.10 Assessing the evidence to which he refers, Blaug concludes that for secondary and higher education it is reasonable, as a rough-and-ready principle, to attribute about three-fifths of earnings differences between educational levels to the effect of education

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* Using the terminology of E. F. Denison (1962) *The sources of economic growth in the United States and the alternatives before us*, US Commission for Economic Growth, Supplementary Paper no. 13.

† Psacharopoulos, reviewing a wide range of evidence, estimates a crude 'average' value (based on a variety of countries, levels of education, and types of data) of 0.77. See Psacharopoulos, G. (1975) *Earnings and education in OECD countries*, Paris, OECD, chapter 2.

itself. Pscharopoulos corrects this to about four-fifths. Making allowance for this factor therefore involves a correction slightly greater in magnitude than that which we earlier indicated was necessary to allow for income taxation, i.e. a reduction of about a third. As far as the calculations of our student are concerned, the effects are, of course, superimposed upon one another. Thus allowance for the fact that incomes are taxed, and that only a portion of income differentials are due to additional education, leads to the conclusion that the basis of the rational student's private calculation should be just over a half $\left\{\frac{4}{5}\times\frac{2}{3}=\frac{8}{15}\right\}$ of expected earnings differences over a working lifetime.

Uncertainty

4.11 Whatever corrections are made to earnings data based on the earnings of a large number of individuals, none of these can make allowance for the fact that the situation facing the individual is a great deal more uncertain than that facing a generation or 'cohort' of students. The individual will face uncertainty as to the earnings he can expect, either as a graduate or as a non-graduate. His expected difference in earnings, therefore, will result from the subtraction of one uncertain quantity from another. The expectation of being able to work throughout one's lifetime, and even of surviving up to retirement age, is also subject to uncertainty.

4.12 Women, for example, have a high, but uncertain, prospect of periods of unemployment. They may expect to quit the labour force for an interval during their working lives and to return to it after having raised a family, but they can only roughly foresee the years during which they will do this and they cannot know whether they will be able to return to work in any form of continuity with their previous employment. Similarly, it is probable, but not certain, that a given individual will survive up to retirement age. Even if he or she does so, illness may prevent their working (or working full time) for significant parts of their life-span. What the uncertainty attaching to all these factors means is that the expected age–earnings profiles of individuals must be visualized as a zone rather than a single line—a zone denser nearer the centre but still having very considerable spread. The zone will also spread out over time, reflecting the greater uncertainty of the more distant future.

4.13 Figure 16 gives some idea of the uncertainty attached to individual graduate's earnings. One must also remember that the path of an individual's earnings over time will contain much greater variation than these 'aggregated' profiles indicate. An individual's earnings will generally advance in sudden steps, and sometimes—equally suddenly—falls, giving a jagged pattern rather than a smooth profile.

4.14 Individuals may be expected to react to uncertainty and risk in different ways. For some the chance of only a slight financial gain from higher education will be much more than compensated for by the possibility of earning an extremely high graduate salary; they will behave as 'risk-seekers'. 'Risk-averters', on the other hand, will tend to opt for courses of study in which the gains, while perhaps less on average than in others, are known with greater certainty. Clearly, choice between courses in this regard is closely connected with the individual's intentions and expectations for a specific occupation after graduation. It could be argued, for example, that the relatively high proportion of women students and students from working-class backgrounds who have sought to enter teaching has stemmed in part from their relatively stronger desire to have earnings which, if not high, were fairly secure and not subject to very large uncertainty above or below the average, and which—especially in the case of women—were more easily available on re-entry to employment after a

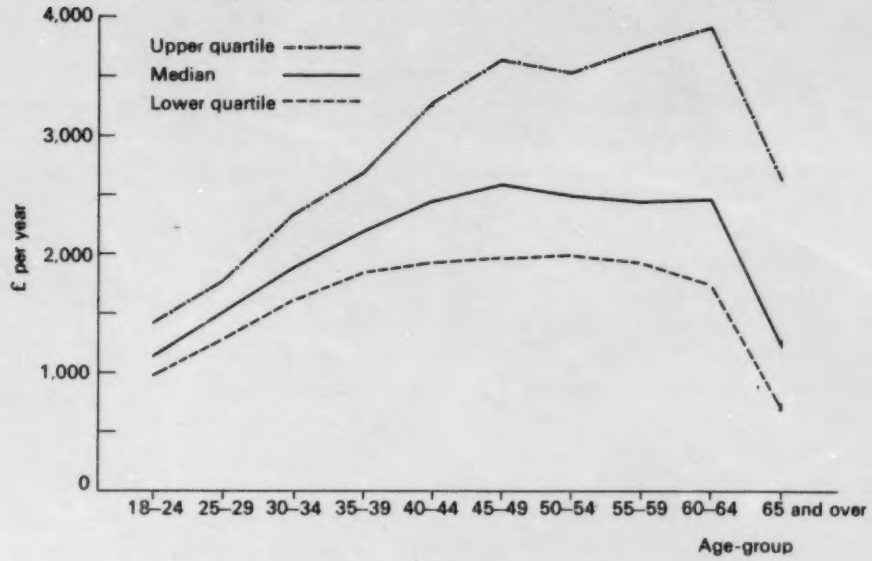

Figure 16 Earnings of male employees with level a/b qualifications

Median and quartile: the 'median' measures the central value of earnings; i.e. that where half the sample earns more and half less. The 'upper quartile' is that value of earnings where one-quarter of the sample earns more and three-quarters less—the 'lower quartile' vice versa.
SOURCE: DES *Survey of Earnings 1966-7.*

period of absence from the labour force.[12] There is some evidence from studies of earnings in the USA that the *avoidance* of risk in individual earnings is associated with lower than average earnings.[13]

4.15 The uncertainty attaching to the earnings of individuals does not affect the significance of social rates of return calculated on the basis of averages, which may contain great internal variations; these are dealt with in Block II, Paper 1.

Fringe benefits

4.16 Differences in pay alone leave out of account other benefits—frequently paid or partly paid for by the employer—which form part of the reward for doing a particular job: the 'fringe benefits'. These include the provision of a car, which may be available also for private use; items purchased on 'expense account'; employer's assistance with housing, insurance, health care and pension schemes. Since most of the information on fringe benefits relates them to *occupation*, not to educational level, it is impossible to make any precise allowance for their value. However, the much higher incidence of fringe benefits in higher-level occupations and at higher salaries makes it safe to say that their effect is to increase the expected overall private returns to education significantly.[14] (We have already mentioned some fringe benefits of being a student that slightly reduce the private costs of higher education.)

Self-assessment Question 8

How would (or will) legislation to make fringe benefits of employment liable to income tax affect the private returns to education? Spend only a few minutes on this. Our answer is given at the end of this paper.

Cross-section and time-series earnings profiles

4.17 All the data on earnings we have looked at so far are based on a snapshot, or cross-sectional, examination of populations of people of different ages in employment at the same point in time. They do not therefore represent the progress of the earnings of an individual, or group of individuals, over the course of their working lives, but a cross-section of successive generations. For the near future, and in particular the period of full-time higher education, this probably does not make much difference. But for more distant periods of working life, especially those forty or forty-five years hence, the difference may be considerable.

We should notice that the alternative—using historical data on the earnings over time of a cohort that has completed its life-cycle—suffers from the same problems, but in reverse, so to speak. Use of such a profile, in its crude form, would give us earnings in the immediate future that bore virtually no relation to the actual earnings that we can predict with a reasonable degree of approximation from cross-section data gathered in the recent past. Since by definition we cannot in the present observe the future, cross-section profiles offer themselves as the nearest, most recent, approximation to the expected earnings of a present generation over its future lifetime. (These problems apply, of course, to all types of investment decision, not merely those of individuals considering courses of higher education.)

4.18 What corrections and adjustments should then be made to cross-section profiles so that they can reflect probable future earnings more accurately? We may distinguish three main reasons why the money earnings of, say, 40-year-old male social science graduates on the one hand and 40-year-old males without university education on the other should be different in twenty years or so from what they are now:

(i) general changes in the monetary levels of wages and prices, such as occurred rapidly in recent years with the acceleration of inflation;

(ii) the long-term growth of real incomes as a whole, reflecting overall long-term increases in the productivity of labour;

(iii) alteration in the distribution of real wages between those of different ages and different levels and types of qualification; this will in general lead to variations in the shapes of future age–earnings profiles.

We deal with these three factors in turn.

4.19 The influence of the first—broadly speaking, inflation—is, conveniently for us, already eliminated by the use of cross-section data, in that all wage–price levels are taken at a common point in time. It is not necessary to 'deflate' the values of any portion of the net returns stream to allow for changes in the general price–wage level as such, since earnings at different ages are all expressed in pounds at the same time and with the same purchasing power. Our data, so to speak, reproduce the supposition (made in paragraph 2.3 above) that there is no inflation.

4.20 The general effect of economic growth, assuming that it involves the growth of all wage structures at the same, or very similar, rates in the long term, is to increase the private returns from education (but also, of course, to increase in an exactly parallel fashion the private returns from alternative types of education, and in general, from alternative types of education, and, in general, from other possible 'investments'). If we make the simplifying assumption that all anticipated private costs and benefits will be enlarged by a factor corresponding to a steady annual rate of growth, the impact is analytically very simple. As far as the calculation of net discounted values is concerned, the effect is to produce values corresponding to a rate of discounting

which is reduced by the assumed percentage rate of growth. Thus, the effect of discounting an unadjusted net returns stream at 15 per cent, and then of allowing for a 5 per cent annual rate of growth of all returns, is identical to the effect of applying a discount rate of 10 per cent. Equally, the effect on the internal rate-of-return calculation of assuming a similar constant rate of growth is simply to *increase* the derived internal rate of return by the assumed rate of growth.

4.21 But the third factor—changes in the relationships between age–earnings profiles for different levels or subjects of education—cannot, even conceptually, be handled in such a simple way. To foresee these changes one would have to be able to predict, and judge, the effects of changes in the *structure* of the labour market—the overall pattern of skills and occupations demanded and supplied. The final section of this paper and Block II of the course discuss some of the main forces that may be acting on this structure in a period of expansion of higher education, perhaps—for example—to depress the salaries of graduates in relation to those of non-graduates.

Self-assessment Question 9

The age–earnings profiles for all graduates, social science graduates and science graduates (in Figure 13) have one feature in common. They rise to a maximum in middle age and show a slight fall in the decade or so to retirement at 65. Can you suggest why this is so? Our comments follow below.

4.22 The main explanation is probably the greater extent to which men nearing retirement opt for less testing, in some cases part-time, jobs. Yet, in fact, very few individuals expect to experience a *fall* in money earnings in the years before retirement. The apparent discrepancy disappears when one recalls that a slight level of inflation and/or growth in salaries would be sufficient to convert the gentle falls observed into slight rises as far as the experience of individuals over time is concerned. The difference highlights the distinction between cross-sectional and time-series information.

Reading 9 At this point you should read the article by Ziderman, mentioned in the preceding sections, 'Does it pay to take a degree?' (see note 9), which you should now find easier to grasp. It gives an idea of the magnitude of private rates of return to qualifications on British higher and further education in the relatively recent past, with allowance made for some of the major factors we have measured. Notice that Ziderman adjusts his cross-sectional age–earnings data to:

(i) exclude some occupations where, in his view, earnings poorly represent the individual's private benefits;

(ii) allow for tax deductions;

(iii) allow for probabilities of not being employed;

(iv) allow for the fact that not all the earnings differences are due to extra education;

(v) allow for drop-out by students.

Ziderman's article should take you about twenty minutes to read.

4.23 The internal rates of return that face students considering the next rung of the educational ladder are shown by Ziderman's 'marginal' (or 'incremental') rates (Chart 2). Ziderman finds that, for men, the adjusted rate of return falls markedly from first degrees to higher degrees. Allowing for drop-out (as well as his other adjustments), the additional returns from masters' degrees and doctorates are less than the private costs at *all* positive discount rates. But you should recall that the relatively small size of the sample in each age-bracket makes Ziderman's estimates rather uncertain.[15]

Patterns of student choice

4.24 All the adjustments to the hypothetical calculations of hypothetical students that we have mentioned do nothing to establish that students do make any such calculations, with or without these allowances and adjustments, or even that they are in fact influenced at all by the relative monetary costs and benefits of different educational options. We may feel, on common-sense grounds, or by recalling key decisions that we or those close to us have made, that such factors have an important influence, but such evidence is necessarily anecdotal. The empirical evidence is not easy to present or assess in any brief form. However, it does suggest that in so far as perceived earnings differences are seen as being connected with educational choices, they do have an important effect on those choices for a proportion of students.

4.25 Gordon and Williams, in the preceding paper, showed that the greater fifth-formers perceived pay advantages to the highly qualified to be, the more they were likely to stay on in full-time education. Gordon and Williams also referred to the study of US graduates by Freeman,[16] which presents strong evidence that at this level of the education system American graduates and employees react strongly and quickly to changes in relative earnings. His main points, and the main forms of market mechanism that he discerns, are set out in the summary of findings, from the introduction to his study, reprinted below (with our additional notes).

Reading 10

Principal findings

The main empirical findings of the study may be summarized as follows:

(1) Expansion of the college-trained work force has been accompanied by great shifts in the composition of specialities and of levels of education. The proportion of men in various curricula* changed dramatically over time, often in different ways at different levels of training. The number of bachelor's degree engineers, for example, declined greatly relative to the total college population from 1950 to 1965, while the number of Ph.D. and M.S. engineering students increased.

(2) The role of the college major† in preparing students varies by field and degree. Baccalaureate study in engineering and accounting is confined almost entirely to persons planning careers in those fields. By contrast, most social science majors obtain jobs in occupations only remotely related to social science disciplines. At higher degree levels, areas of study are closely linked to specific occupations, with a near one-to-one correspondence between the doctorate or professional school major and area of work (Chapters 3, 10). The intention of graduates to seek employment in a field is influenced by the state of the labor market, especially at the bachelor's level.

(3) The doctorate market has flourished in recent years. From the mid-1950's to the current period (1968–69) doctorate incomes increased more rapidly than those of other workers. Mathematics, engineering, and economics recorded especially large gains. Throughout the period the rate of return to the doctorate was substantial, particularly after adjustment for the nonpecuniary value‡ of university employment. It has been in the area of 10–14 percent.

(4) The lifetime income of doctorate specialists, discounted at rates ranging from 0 to 10 percent, differs noticeably among fields of study. Part of the variation is due to nonpecuniary income associated with the distribution of jobs between industry and education. The rest may be attributed to disequilibrium in the market.

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* I.e. studying various subjects and subject combinations.

† Bachelor's degrees in the USA are generally less specialized than in the UK. The 'college major' is, generally speaking, the *central* subject or discipline studied.

‡ I.e. 'non-pecuniary'; see above.

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(5) Stipends account for a sizable fraction (5–6 percent) of doctorate lifetime income. The availability of stipends varies across fields, with the biological sciences offering the most awards per student. After *Sputnik I*, the value and number of awards increased greatly. Both the inter-field and time series variation in awards is primarily attributable to the fellowship policies of the federal government.

(6) Stipends significantly affect career decisions. Fields with a relatively large number of awards attract more students than would otherwise be the case. Moreover, by making full-time study feasible, stipends reduce the time spent obtaining a degree. In the long run the effectiveness of stipends drops, as the induced growth in the number of graduates in supported fields lower salaries and the incentive to enter.

(7) Foregone income is an important factor in the decision to enroll in higher education. Student estimates of foregone income are closely aligned with the earnings reported by comparable workers. Comparisons of estimated foregone income and potential future earnings reveal a high subjective rate of return, which is consistent with the decision to attend school. Many students volunteer foregone income as the principal cost of schooling.

(8) While students receive substantial subsidies in the form of stipends and below-cost tuition charges, they are not 'freeloaders' on the non-student taxpaying public. Most of the cost of schooling is attributable to foregone income, which is paid by students. The taxes received on the additional earnings of persons induced into college by subsidies repays nearly all of the remaining cost. Since much of the repayment is through higher federal income taxes, funds are transferred from the states with public education programs to the federal government.

(9) The supply of young men to high-level occupations is governed by economic incentives. All else being the same, increased wages attract students to a field and add to the supply of specialists several years later. Lags in supply are due primarily to the length of educational programs. Both econometric and survey data indicate rapid response to changes in market conditions.

(10) Students in the 'pipeline of production' also alter career plans in response to changes in economic incentive. When salaries increase rapidly in a field, more students are likely to complete their studies than would otherwise be the case. In engineering, for example, the dropout rate is a function of the state of the market for graduates in the junior year relative to that during the freshman year.

(11) In specialties with narrow vocational curriculum, lengthy cumulative training, and moderate long-term increases in demand—engineering, accounting, and MBA management in postwar years—the market operates under cobweb adjustment.* The fraction of students choosing these fields fluctuates cyclically: a large graduating class depresses salaries and causes a relative decline in the number of entrants; when a small class graduates, salaries are increased, causing a jump in enrollment, and so on. Cobweb fluctuations follow a stable dampened pattern. 'Random shocks' produced especially large fluctuations in engineering in the 1948–67 period.

(12) In specialties with more dramatic shifts in demand and/or longer training periods—mathematics, and chemistry and most doctorate fields—the market operated under incomplete adjustment in postwar years. Short-run changes in supply can be explained by the level of disequilibrium in a market (as measured by discounted lifetime income relative to incomes in comparable fields). Long-term changes in supply appear to result from changes in salaries caused by shifts in demand.

(13) Experienced workers also respond to the economic incentive of market disequilibrium and/or changes in equilibrium incomes. When salaries are high or rapidly increasing in an occupation, older doctorate graduates enter from related specialties. Similarly, high or rising salaries cause shifts in the allocation of Ph.D.'s among employers.

(14) Changes in the salaries of college graduates are explicable by shifts in supply and demand schedules. When a large number of students graduate in a speciality,

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* For a fuller discussion of 'cobweb adjustment' see Maureen Woodhall's Paper 2 in Block II.

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the rate of increase in salaries is reduced; when industries that normally employ graduates expand, salaries are increased. In any given recruitment period, however, salaries do not clear the market. Salaries adjust relatively slowly to shifts in supply that are not foreseen by firms.

(15) The availability of places in universities, as reflected in teacher/student ratios and the size and inter-field composition of faculties, adjusts to the demand for education within the limits set by the internal and external labor markets and university budget constraints. The internal market operates through the desire of administrators to have an 'equitable' salary scale, with narrow inter-field variation in salaries. Rates of promotion and nonmonetary perquisites are used to circumvent the internal constraint. They are not perfect substitutes for differential salaries: specialties with especially strong nonacademic demand report relatively many vacancies in the university system.

(16) Faculty salary and employment levels are determined simultaneously in the faculty labor market. The supply of new and experienced specialists to universities is relatively elastic. Salaries are flexible within certain limits, adjusting with a lag to supply to demand shifts. Increases in the demand for education induce large enough increases in the number of places that capacity limitations in higher education do not seriously limit the supply of specialists.

(17) Corroborating the econometric evidence, survey data show the career decisions of students to have the flexibility and responsiveness to economic incentive required for an elastic supply curve. Most students choose a career while they are in college and give serious consideration to alternatives. Many are willing to alter their plans when information or conditions change. A wide variety of possibilities is considered by men with different career intentions.

(18) Students appear to be well informed about economic opportunities in the market for college graduates. Subjectively, most consider the information available at the time of their career decision to be adequate for a sensible selection. Objectively, their evaluation of the economic characteristics of such well-known professions as medicine or law and of specialized doctorate fields is in accord with economic reality. The perceived positions of careers with respect to starting salaries, growth of income over the life cycle, and changes in job opportunities are nearly perfectly correlated with statistical measures of these characteristics.

(19) Student income expectations are realistic when compared with actual market incomes. The levels expected for the future are in accord with reasonable projections of current salaries. Differences in income expectations among students with different career plans mirror the actual structure of salaries. Students in fields with high current remuneration expect above-average earnings and rank their career high in the income distribution of college specialties. Awareness of economic opportunities extends to the entire life cycle of earnings.

(20) Perceptions of other occupational characteristics, including the chance to earn great wealth and the risk of variability of income opportunities, are also in accord with market phenomena. Students planning legal careers, for example, are aware of the income variability and risk involved in law, while those intending to teach recognize the relative security of that profession. Past changes in income are expected to continue into the future, which suggests that students extrapolate rates of change as well as levels of income in forming anticipations of lifetime income.

(21) Persons who are identified as 'marginal suppliers' by their willingness to change careers upon receipt of additional information appear to be especially sensitive to economic stimuli. These students express dissatisfaction with economic opportunities in their chosen career and seem to be searching for a superior alternative. Students with especially high evaluation of monetary incentives also make career decisions in an a priori sensible way, flocking to occupations where salaries are high and expected to increase greatly. Fields which students view as offering especially good income opportunities relative to comparable alternatives tend to increase most rapidly.

In broad perspective, these results present an arresting picture of the market for high-level manpower. Here, the market operates in accord with economic theory, with an informed group of suppliers responding rapidly to economic incentives and salaries determined, albeit with a lag, by supply and demand. The imperfections, immobilities, and institutional rigidities often regarded as characteristic of labor

markets do not prevent the price system from allocating students to professions. The contrast between these findings and those from studies of 'blue-collar' markets suggests that the trend toward an increasingly professional, college-trained work force will produce a more 'classical' labor market.

4.26 The evidence that Freeman summarizes draws on time-series information; no comparable information is available regarding the process of choice of British students, nor have any comparably thorough studies been made here. It is clear, though, that there will be important differences between the labour market for graduates in the two countries—for instance the much more important role of the state as an employer paper and Block II of the course discuss some of the main forces that may be acting in Britain. As Gordon and Williams have indicated above, however, evidence is accumulating that the choices of *some* British students are sensitive to their view of relative earnings.[17]

4.27 You should also notice that this evidence tends to show only that *some* students are responsive to earnings differences in general, not that they respond in any direct way to the types of precise private cost–benefit measures with which this paper has largely been concerned. None the less shifts in relative earnings of the type that Freeman discusses will alter the private rates of return to higher-education courses in directions consistent with students—or some students—being motivated more directly by these measures. In this sense, provided that at the margin some students adjust their choices in response to changes in perceived relative earnings, it is plausible to speak of the private returns to higher education entering into the 'demand function' for education sketched by Gordon and Williams in the preceding paper.

5 What do private returns signify?

5.1 In this section we deal with issues that have an important bearing on the significance of rate-of-return calculations—both private calculations of the type we have discussed above, and calculations of the social rate of return such as will be discussed in the following paper. The aim is not to *settle* any of the central questions about the appropriate use in policy-making, or validity as an empirical explanation of individuals' behaviour, of rates of return or present value calculations. It is rather to present at least some of the main problems that must be grasped to gain a rounded view of the difficulties involved in attaching sense to, and making use of, such calculations.

5.2 Hitherto we have assumed that cross-sectional data on the costs of education and the age-specific average earnings of individuals (suitably corrected for expected rates of real economic growth over all) are an appropriate basis for calculating expected rates of private and social return. Such a basis clearly assumes that the general shape of age–earnings profiles will remain stable into the indefinite future,[18] all sections of all profiles continuing to grow, in real terms, at the same or a very similar rate. There are, however, *prima facie* reasons why this might well not be so.

5.3 During a period of general expansion of higher education the composition by skills and types of training of the labour force as a whole will be continually changing. For example, the proportion of graduates to non-graduates in the labour force (level of education being a crude proxy for the possession of a range of more-or-less specialized skills) will be continually increasing. (We should notice that this will be the case even when the proportion of young people completing higher education is not increasing, but stable, but where this proportion is significantly higher than the proportion of graduates to non-graduates in the labour force among the older generations. In other words, past enrolments will continue to raise the average 'density' of graduates in the labour force for some time.) The long-term effect of this process may well be to reduce proportional earnings differences between graduates and non-graduates since, viewed as a proportion of the labour force as a whole, the supply of graduates

is becoming progressively more plentiful, and that of non-graduates relatively less so. Note that changes in these overall *supply conditions* will not necessarily lead to a reduction in earnings differences. They may, for example, be compensated for wholly or in part by changes in *demand conditions*. As the overall techniques and conditions of production alter, generating more and more occupations for the satisfactory performance of which higher education is a prerequisite, or a desirable condition, employers' demands for graduates rather than non-graduates may also increase.[19] But our general point is that there is no necessary reason, in the development of demand and supply for educated labour across a vast range of skills and occupations, that the present shape of cross-section age–earnings profiles should be preserved indefinitely.

5.4 With respect to the calculations of private individuals considering courses of higher education, the point has already been made that the differences between net expected earnings at alternative, adjacent levels of education do not completely describe the private benefits that the individual could reasonably expect. We have mentioned the range of 'fringe benefits' that serve to increase the individual's disposable income by providing him with benefits and services for which he would otherwise be obliged to pay.

5.5 Some less tangible benefits are also associated with higher education, and with the activities and types of employment to which it gives access. Perhaps the most general (though, for that very reason, one of the most difficult to value and incorporate in an overall calculation expressed in monetary values) is the fact that graduates and those with other types of higher education usually prefer the jobs opened up to them by their educational level to those in which they would probably have found themselves employed had they ceased their education earlier. True, the preferences of individuals as to the 'non-pecuniary' benefits of occupations may differ very sharply. But at the same time it would not be difficult to discover a widespread consensus that the job of a university teacher or a solicitor is more enjoyable (or less distasteful) than that of a coalface worker or a clerk. We shall not attempt, in this section, any overall or systematic treatment of the problems of valuing these benefits to the private individual. But common sense clearly suggests that private calculations based wholly on monetary benefits are likely to underestimate the subjective valuations placed on courses of higher education by potential students.

5.6 Reverting to the 'demand function' sketched by Gordon and Williams, it would clearly be artificial to insist that the non-pecuniary benefits of education—both at the time and later in working life—should unambiguously be brought within the sort of economic framework we have outlined. It would be equally plausible to see many of them as elements of what Gordon and Williams call the 'personal tastes' (P) of potential students.

Reading 11 As the last reading for your work on this paper, you should read Chapter 3 of O'Donoghue's *Economic dimensions in education* ('Education as a personal investment'), which reviews some of the major points made above. You should notice an additional issue that he raises—the problem of valuing the leisure-time forgone by students in undertaking education (pp. 46–55). Note that O'Donoghue tends to separate problems of valuing leisure-time from an interconnected issue—how education should be distinguished as between 'investment' and 'consumption', in this context by the individual. Once it is granted that at least some aspects of the process of education are enjoyable, so that time spent on them represents benefit to the individual student, rather than cost, the question becomes more complex than appears from O'Donoghue's presentation. Carried to its logical conclusion, the argument that the 'consumption benefits' of an activity should be reduced by, or set against, the value of the time spent on them (measured, for argument's sake, at the prevailing wage-rate) implies that time is *in itself* a cost and that, for example, the 'cost' of toffee to the consumer is higher than that of popcorn purely because it takes longer to chew. We do not wish to suggest that these conceptual issues can be easily resolved. Indeed it may well be that they are inherently metaphysical, but you should bear such problems in mind in weighing O'Donoghue's arguments.

Conclusion

5.7 In drawing together the strands of your work on this paper you should bear in mind that it forms part not only of your work for Block I but of the aggregate of topics covered in Blocks I and II. The general framework within which we have discussed the analysis of *private* costs and benefits, and the ways in which they may be combined within the basic measures of cost–benefit analysis, is identical with the framework you will be using in Paper 1 of Block II to assess social costs and benefits. The focus there will be on the potential and actual implications of social rates of return for assessing and altering public policy on enrolment and spending in higher education.

5.8 Our focus here has been on the situation—and especially its identifiably economic aspects—facing the individual student, and on the ways in which students, or some students, may be expected to react to it. The policy implications of rates of return are, in the main, the concern of the next paper. But you should notice that the general questions of whether and how students react to earnings may have an important bearing upon public policy for post-compulsory education. Take for example the choice among disciplines at first-degree level in higher education. A policy designed to expand areas in which the social rate of return is relatively high, and contract (or at least not expand so rapidly) those in which it is relatively low, might well tend to be more congruent with shifts in student applications than one that ignored or overrode the 'indicators' provided by rates of return. This would be the case, at least, where differences in social rates of return reflected mainly differences in relative earnings, and so long as the private costs did not differ greatly according to subject. This is not, of course, to say that rates of return should be the only, or even the main, 'signals' for public policy. Nor is it to claim that there is an established economic, social or educational case for bringing private rates of return into alignment with social rates of return, for example by reducing public subsidies.

5.9 In this paper many of the elements that can be included within the individual student's economic calculus have been allowed for only very approximately, or in exceedingly general terms. You may feel that this vitiates the possibility of defining private rates of return to courses of education, and then measuring them, in any way that could provide a useful predictor of student enrolments or applications. And—since a theoretical framework cannot be judged without specifying at least some of its predictions and testing these against outcomes—our study of private rates of return must, to a large extent, remain academic—in both senses of that term.

5.10 All the factors and elements that we have discussed in this paper (and some that we have not), however, may in principle be expected to enter into the decisions of individual students. And it remains arguable that—other things being equal—individuals will tend to discount many elements of their expected pattern of costs and benefits over time. It therefore seems more than a merely academic exercise to spell out the main frameworks within which economists have sought to bring into single measures the totality of costs and benefits faced by individual decision-makers, such as students. Some such compressed measure is necessary for there to be even a possibility in principle of using these patterns to predict student choices. The evidence available on the impact of private costs and benefits on student choice does not—in almost all cases—embrace more than a fragment of those elements of which the student will have *some* perception (no matter how hazy). But this has as much to do with the preliminary character of research in the area as with the fact that the measures of cost–benefit analysis become stretched and artificial once one attempts to apply them to private educational decisions.

5.11 It is important to reiterate, therefore, one of the main points with which we started: 'the problems of spelling out in detail, and then estimating statistically, a "function" describing the aggregate demand for higher education in the population as a whole

(or the relevant age-groups) are fundamentally different from the problems of describing the situation facing an individual student, or prospective student' (para. 1.2). A 'demand function' for education, such as was developed by Gordon and Williams in Paper 2 of Block I and the associated readings, must be tested and assessed according to its success in predicting shifts in aggregate behaviour, such as applications. The private costs of, and benefits from, higher education may well be important variables in such a function:

(i) Even if not all students—perhaps even only a small minority—have their behaviour affected by the relevant changes in costs and/or benefits; it is sufficient if just some students 'at the margin' are affected.

(ii) Even if there is no evidence that students have any clear perception of the costs and benefits involved, or bring them within any particular framework, if *some* students switch to courses where there have been, say, reductions in private costs and increases in private benefits, we can claim that the elements that make up the private rate of return to education are among the effective predictors of aggregate student demand.

Answers to self-assessment questions

Self-assessment Question 1

Some costs
- cost of car
- vehicle tax
- insurance premiums
- cost of fuel, oil, etc.
- cost of maintenance, repairs, etc.
- cost of garaging

Some benefits
- cost of fares on journey now made by car
- greater convenience on some journeys
- similar saving of time
- lower cost of household purchases

It is clear that, although we may be able to estimate the present worth of some of these with some precision, the future is much more hazy. The same applies to all educational decisions.

Self-assessment Question 5

The effect would be to increase both the net discounted benefits (at any rate of discount) and the internal rate of return.

Self-assessment Question 6

If the student were able to work during vacations, this would reduce the net private costs of education in the immediate future by the extent of his vacation earnings. In general, one of the effects of high unemployment among young people seeking casual work—the increasing scarcity of vacation jobs for students—will tend to increase the (expected) private costs of a degree. But this is on the assumption that the student, had he not opted for higher education, could certainly have found full-time employment, or had a much better chance of doing so. In so far as this is *not* true, the effect may well be in the opposite direction.

Self-assessment Question 8

It would reduce returns to education, if we assume that fringe benefits form, on average, a higher proportion of higher incomes and/or that the rate of tax is higher on higher incomes.

Notes and references

1 Department of Education and Science (1972) *Education: A Framework for Expansion* (Cmnd 5174), London, HMSO.

2 DES (1972) *Teacher Education and Training, Report by a Committee . . . under the Chairmanship of Lord James of Rusholme*, London, HMSO.

3 Op. cit. (note 1).

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4 Committee on Higher Education (1963) *Higher Education: Report of the Committee . . . under the Chairmanship of Lord Robbins 1961–63* (Cmnd 2154), London, HMSO, p. 1, para. 1: subsequently referred to as the Robbins Report.

5 Robbins Report, p. 55, para. 149.

6 Robbins Report, p. 55, para. 149.

7 Freeman, Richard B. (1971) *The market for college-trained manpower: a study in the economics of career choice*, Cambridge, Mass., Harvard University Press.

8 Reported in Gordon, Alan and Williams, Gareth (1976) *Attitudes of young people to school, work and higher education*, University of Lancaster, mimeo. See also DES (July 1976) *16 and 18 year olds: attitudes to education*, Report on Education No. 86.

9 Ziderman, A. (1973) 'Does it pay to take a degree? The profitability of private investment in university education in Britain', *Oxford Economic Papers*, July 1973, pp. 262–74.

10 Op. cit. (note 1), para. 117.

11 For a seminal statement of this theory see Wiles, P. J. F. (1973) 'The correlation between education and earnings: the external test not content hypothesis', *Higher Education* Vol. 3, no. 1.

12 Some evidence for this is given in Kelsall, R. K. *et al.* (1974) *Graduates: the sociology of an élite*, London, Tavistock Publications.

13 See Taubman, P. (1975) *Sources of inequality in earnings*, Amsterdam, North Holland Publishing Co., especially pp. 197–8.

14 The evidence is reviewed in Psacharopoulos, George (1975) *Earnings and education in OECD countries*, Paris, OECD, chapter 6.

15 See Bibby, J. (1973) 'Internal rates of return: some statistical considerations', *Bulletin of the International Statistical Institute*, Proceedings of the 39th Session, Vienna.

16 Op. cit. (note 7).

17 See also Westoby, A., Williams, G. L. and Webster, D. F. (1976) *Social scientists at work*, London, Society for Research into Higher Education, in which evidence is presented that earnings differences among social science graduates in different subjects during the 1960s shifted in a manner broadly consistent with their being part of the explanation for the observed changes in the proportions of university entrants by subject.

18 On this see Ziderman, op. cit. (note 9), and above paras 4.22 and 4.25.

19 This is suggested, for example, in the 1972 White Paper (op. cit., note 1), para. 116.

Economics and Education Policy

COURSE OUTLINE

Block I The Planning of Higher Education—the Private Demand

1 Introduction to Blocks I and II by Adam Westoby
2 Forecasting the Private Demand for Education
by Alan Gordon and Gareth Williams
3 Factors influencing the Demand for Higher Education
by Alan Gordon and Gareth Williams
4 The Individual's Private Investment in Education
by Adam Westoby

Block II The Planning of Higher Education—the Social Demand

1 Education as a Social Investment
by Vera Morris
2 Manpower Planning and the Demand for Qualified Manpower
by Maureen Woodhall
3 Conclusion to Blocks I and II
by Adam Westoby

Block III The Internal Efficiency of Education Institutions

1 Introduction to Block III by Leslie Wagner
2 The Measurement of Output
by Leslie Wagner
3 Cost Studies and Efficiency
by Donald Verry
4 Increasing Education Efficiency: the Role of Educational Technology
by Leslie Wagner
5 Financial Incentives and Efficiency in Education
by Donald Verry

Block IV The Finance of Education

1 Introduction to Block IV by Leslie Wagner
2 The Existing System of Finance
by Howard Glennerster
3 Alternatives in the Finance of Education: Vouchers
by Maureen Woodhall

Block V Education, Equity and Income Distribution

1 Introduction to Block V
by Vera Morris
2 Education and Income Distribution
by Vera Morris
3 Some Distributional and Equity Aspects of the Student Loans Debate
by Donald Verry

Accompanying the above blocks in the course are various supplementary material, including offprints of readings, broadcast notes, tutor- and computer-marked assignments, and the *Introduction and Guide to the Course* (prepared by Leslie Wagner) and *Economics and Education Policy: Using the Literature* (prepared by Sheila Dale).